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COMPUTERWORLD

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Honeywell's small systems group will dismiss 600 employees in its second layoff of the year. **Page 81.**

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Boeing's purchase of 5ESS digital switches is part of a move to save $150 million. **Page 37.**

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McDonnell Douglas Computer Systems Co.'s Microdata 9000 series of minicomputers expands with two additional models. **Page 63.**

■

A Computer Corporation of America spokeswoman said last week that Crowntek, Inc. rejected a Pansophic Systems, Inc. offer to buy CCA. Pansophic recently offered an unspecified sum for Cambridge, Mass.-based CCA, which was acquired by Crowntek of Toronto last year.

■

The curtain may have fallen on the "lock-and-key" copy protection scheme announced by the Association of Data Processing Service Organizations, Inc. last January. Micro software vendors have shown few signs of support for or even interest in the approach. Lotus Development Corp., the scheme's strongest backer, last week damned it with faint praise, the most positive comment being that "it's not a dead idea."

"We got some very specific feedback from a large number of customers that this is not an appropriate way to go,"

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Big user nixes shielded wire

Twisted-pair scheme used for synchronous terminals

By John Dix

NASHVILLE — One of the nation's largest communications equipment vendors, Northern Telecom, Inc., uses telephone-type twisted-pair wire to support all the synchronous terminals in its new U.S. headquarters.

This decision, communications experts concur, should hearten users considering twisted-pair wiring as an alternative to coaxial cable.

Supporting synchronous devices with twisted-pair wire instead of coaxial cable, which can be 10 times more expensive, is a relatively new idea. The issue was brought to a head recently when IBM, the leading

See **BIG** page 10

Lotus shops for next technology

By Eric Bender

CAMBRIDGE, Mass. — Moving to accelerate product development efforts, Lotus Development Corp. disclosed plans last week to purchase the small, year-old creator of a natural language interface for Lotus' 1-2-3 package.

GNP Development Corp. of Pasadena, Calif., manufactures the Human Access Language package, originally scheduled to ship earlier this month for $295. HAL impressed attendees at last month's Comdex/Fall '85 trade show with its ability to let users access 1-2-3 functions through simple English commands.

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Bank blames nightmare on software flop

By Mitch Betts

WASHINGTON, D.C. — The failure last month of the Bank of New York's automated government securities system was the result of a software design flaw that caused data to be stored incorrectly when trading reached a record high level, according to testimony before a congressional panel last week.

The chairman of the Bank of New York explained to concerned congressmen how the trading system failed and disrupted the government securities market on Nov. 21 at a cost to the bank of $5 million [CW, Dec. 2].

J. Carter Bacot, chairman and chief executive officer, said a software change in the bank's Government Securities Clearance Service system failed to provide instructions to the CPU on how to store data on securities issues when the number of issues exceeded 32,000.

"On Nov. 20, the number of issues being cleared exceeded 32,000 for the first time," Bacot testified. "Lacking adequate storage instructions for the additional data, the computer stored the data incorrectly and corrupted the data base," he continued.

The problem was discovered the next day, and eventually the software was patched; but in the meantime, the bank was unable to deliver more than $20 billion in government securities to the purchasers. To cover the overdrafts, the Federal Reserve Bank of New York extended an emergency loan of $22.6 billion to the bank.

The Bank of New York assigned two teams, 55 people in all, to work on the problem. One team developed a temporary patch — a short-term programming fix — and another team began an entire redesign of 700 programs, Bacot testified. The tem-

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CW EXCLUSIVE

MIS, Inc.: Loctite data pros set up outside shop

By Rosemary Hamilton

It could have been the typical MIS management nightmare: Staff members develop an innovative in-house software program with commercial sales potential, and at the same time they decide they do not want to work on the IBM hardware the company has chosen for its future computing needs. Seven key people decide to quit and form their own company.

However, at Loctite Corp., a specialty chemicals manufacturer in Newington, Conn., the bad dream did not happen.

The seven people did indeed leave, forming a spin-off called Info-Point Corp., headquartered in Wethersfield, Conn. With the marketing rights to a decision support software package called Focal-Point, the group is now preparing to test the waters of the software industry. Info-Point is providing consulting services to Hewlett-Packard Co. product users as well. But the new company founders retain close business and personal ties with Loctite, and all parties say the new arrangement has worked out in the best possible manner for all concerned.



Niels Schulz

The stage for this would-be horror story was set in November 1984. A six-member steering committee at Loctite corporate headquarters was in the process of selecting new hardware for the Newington facility to replace existing HP 3000 minicomputers.

David Freeman, a senior vice-president of Loctite and president of the $250 million corporation's North American division, was top management's spokesman and chairman of the committee. Freeman's hardware choice was an IBM System/38. He chose it because all of the company's offices in 15 different countries were operating on

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NEWSPAPER

MIS goals must fit firm's strategy

Capacity planners should think business, not just DP

By James Connolly

DALLAS — Corporate business plans and revenue growth must be primary considerations in planning capacity requirements for MIS systems, according to former MIS executives who have moved into corporate management positions.

Capacity planners, MIS managers and systems analysts meeting here last week at CMG'85, the international conference sponsored by the Computer Measurement Group, Inc., were warned repeatedly that corporate executives require MIS goals to fit within overall corporate strategies.

The theme was repeated by about a dozen speakers throughout the four-day conference. They warned attendees that they must understand their corporations' business plans, financial terms and user expectations if their equipment acquisition proposals, capacity projections and efficiency plans are to be seriously considered by top management.

A former computer room supervisor who is now in senior management, Ron Wright, Occidental Petroleum, Inc. vice-president for administration, noted, "I always have difficulty communicating with the capacity planners. They have to remember that I am dollar oriented and only dollar oriented. The computer is a machine, just another tool. I can see when an elapsed time drops from 0.5 to 0.4 seconds, but the importance to me is what that is going to give the stockholders. ROI [return on investment] is the only important acronym."

Another former DP manager who is now a senior vice-president, Fred Pirman of Humana Corp., encouraged the capacity planners to do their homework so they can factor into their plans predictable growths in demand, such as proven growths in sales, and to prepare as well as they can for the unpredictable, such as corporate mergers.

Pirman and Wright emphasized that communicating with financial specialists, understanding the business as a whole and talking to users, while time-consuming, are the only ways capacity planners can do their jobs right and move up the corporate ladder.

Another speaker, management consultant Anthony Abowd of Data Strategies, Inc., noted that one strike against computer managers is the tendency to change jobs, often with shifts to different industries, while top corporate managers tend to work a full career with only one or two companies in a single industry. That tendency has hampered computer managers' ability to understand the business that they serve and has created a communication gap between computer managers and corporate managers, Abowd said.

"The computer managers have the primary responsibility for closing this gap. We can't expect corporate managers to come down to our level," Abowd said.

Abowd encouraged the attendees to learn how to develop financial proposals to cost-justify their computer acquisition plans. Those plans, he added, compete with other proposals by other managers for the same corporate funds and should be presented in a way that shows the system acquisition as an investment that will pay for itself within a fixed time frame.

The 1,400 attendees also were drawn to discussions of the following issues:

- The use of expert systems, most of which remain in the prototype stage, in capacity management.
- Performance measurement in systems ranging from personal computers and minicomputers to mainframes running IBM's MVS/XA.
- Utilization of DASD and management of the expected continual annual 40% to 50% growth of that disk capacity.

DPMA opposes VDT restrictions

PARK RIDGE, Ill. — The Data Processing Management Association (DPMA) recently adopted a position against legislative restrictions on VDT use, maintaining that there is no conclusive evidence to support claims of radiation or other serious health problems from VDT use.

"DPMA believes that legislation restricting the use of VDTs or limiting exposure to them is premature and counterproductive," the statement said. It added that there is no proof that VDTs cause or contribute to stress-related problems.

The DPMA plans to use the statement as the basis for testimony before state legislatures that have VDT legislation pending, according to Joseph E. Collins, government affairs manager.

A DPMA task force concluded that "existing labor laws, marketing considerations and business economics will all work together to eliminate the vast majority of VDT health-related issues."

"We believe that VDT legislation which mandates major aspects of the VDT environment goes well beyond any demonstrated need and reduces incentives for business to find solutions mutually beneficial to both the business and its employees," the statement said.

The association said most of the verifiable health problems with VDTs are caused by ambient lighting, poor seating, bad posture, improper furniture and other ergonomic problems.

Therefore, the association said, users and vendors should cooperate to ensure the proper installation and use of VDTs at each site, and employers should provide adjustable workstations and educate and train their employees in the proper use of VDTs.

The association also urged vendors to continue their product quality control efforts to ensure the safety of their products, and it advocated continued research on VDT use.

— Mitch Betts

CORRECTIONS

The article "Eclipse MV additions leapfrog DEC" [CW, Nov. 25] listed incorrect maximum memories for two Data General Corp. systems.

The correct maximum memory for the MV/20000 Model 1 is 64M bytes, and for the MV/10000, the correct maximum memory is 32M bytes.

In reference to "DBMS upgrade out for VAX" [CW, Nov. 18], the VMS operating system is a product of Digital Equipment Corp.

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The familiar black-box technique can be used as an automatic verification process to speed programs into production/ **53**

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Lotus shops for next technology

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The purchase is "good news for both companies," commented Robert Lefkowits, director of software research at Infocorp, a San Jose, Calif., market research firm.

Lotus is ideally positioned to market HAL, "which is a hot product," he said. "This will not triple the size of the Lotus spreadsheet market, but it will further solidify 1-2-3 as a leader."

Jerry Kaplan, Lotus' principal technologist, described HAL as "the first practical limited natural language application that really works, that solves problems." He said that HAL's underlying technology will be "a strategically important and commercially very valuable capability for Lotus. It represents a distinct technological advance that will be demanded by users once they're exposed to it."

Kaplan, who cofounded artificial intelligence pioneer Teknowledge, Inc. before joining forces with Lotus, commented that two other micro products with "a serious natural language component" have already shipped: Microrim, Inc.'s Clout and Symantec Corp.'s Q&A. He remarked, however, that natural language currently fits spreadsheets more easily than data base managers.

"A spreadsheet is a more contained environment than a data base; there's a relatively limited number of things you can do," he said. The spreadsheet "has a great deal of content around to interpret your suggestion, so you can be more successful with a less complete system."

'Milk the installed base'

While 1-2-3 remains the top-selling micro software product, many large corporations have been hesitant to move to the latest release, which shipped this fall. Because Lotus' strategy "seems to be to really milk the installed base," selling a HAL-based add-on would make a lot of sense, Lefkowits commented.

However, the company has not yet settled on specific product plans, Kaplan said. "We didn't buy a piece of software; we cut a deal with the GNP folks to acquire that technology." He added, "It's in line with our strategic R&D direction."

Others involved in the acquisition suggested that one or more products may appear by midyear 1986, but that no firm schedules are in place.

GNP Development was founded in November 1984 by Bill Gross, then 26 years old and the owner of GNP Loudspeakers, Inc., a holding company for a computer store, an audio store and a loudspeaker manufacturing plant.

The start-up introduced its first product, CPA+, an accounting program that works with 1-2-3, in December. GNP Development also sells three other add-ons for 1-2-3 and Lotus' Symphony package.

Lotus did not disclose the price for the acquisition, which is expected to be finalized by February.

HAL developers to join Lotus

HAL's two principal developers — Gross and brother Larry Gross, GNP's vice-president of research and development — are expected to join Lotus as consultants while most GNP employees will be laid off. The firm currently employs approximately 15 people.

HAL was designed to work with a large vocabulary of words and phrases drawn from the way people talk about spreadsheets, according to GNP. In one example, users seeking to erase data can choose from "erase," "delete," "clear," "get rid of" and other words.

Additionally, "you can type in partial phrases in English and request that the system tell you the meaningful ways the command can be completed," Kaplan said. "That allows you to explore, in a focused fashion, the capabilities of the product."

Simplifying 1-2-3 for novice users, the software also can speed operations for experienced users. For instance, by typing "total all," users can total all columns in a worksheet much faster than they can with standard Lotus commands, "no matter how great they are at 1-2-3," Gross said.

The software also permits users to write macros in English and features a data base query facility, the ability to link spreadsheets, an Undo command and an audit feature.

HAL's capabilities "will certainly appeal to a reasonable percentage of the installed base," Lefkowits said, although he said that the technology may not greatly assist rank novices who do not know what a spreadsheet is.

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CBT courses supplement live training

By Mitch Betts

WASHINGTON, D.C. — Richard Lichvar, manager of the information center at the Federal Home Loan Mortgage Corp., is a true believer in the use of computer-based training (CBT) to help employees learn the basics of developing and using applications software.

"CBT frees up the information center staff ... to spend less time talking about syntax and more on the applications design," Lichvar explained in a recent interview.

Computers cannot do all of the training work, he stressed. "It does take some person-to-person involvement to get users over the first hurdle — using the computer keyboard and starting the course," Lichvar said.

One-hour introduction

But with CBT, it takes a staff member about one hour to introduce the user to the computer-based course, rather than eight or more hours of steady instruction to cover an entire subject, he said.

Lichvar's employer, also known as Freddie Mac, is one of the nation's largest financial institutions. It is a private, federally chartered corporation that works in the secondary mortgage market to increase the amount of mortgage capital available to home buyers.

The Freddie Mac information center — which serves some 1,000 employees — has about 20 CBT courses on an IBM 3081 running MVS/XA. The center uses the Phoenix CBT system software from Goal Systems International, Inc. of Columbus, Ohio, to present off-the-shelf courseware and to write custom courses.

Lichvar provided several suggestions for the successful use of CBT:

- Do not assume that CBT replaces live training. "Some types of training require a human being as instructor ... but CBT allows you to concentrate the live training on more strategic projects," Lichvar said.
- Mainframe-based CBT courses generally are higher quality than micro-based courses because the mainframe courses are more mature, having been fine-tuned over the last three to five years, he said.
- Do not overwhelm your users or staff by starting a large number of CBT courses at once.

Lichvar said he chose Phoenix because it uses fewer computer resources than its competitors and because it can present courseware written under other vendors' CBT systems, such as IBM's Interactive Instructional System and Boeing Computer Service Co.'s Scholar/Teach.

One of the custom courses developed at Freddie Mac covers the use of Easytrieve/Plus, utility software from Pansophic Systems, Inc. of Oak Brook, Ill. Lichvar said it is the only such course in the country, so he plans to license it to a courseware vendor, with the royalties earmarked to help defray the costs of the information center.

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CCA launches drive into programmer workstation market

Offloading mainframe burden to micros

By John Gallant

CAMBRIDGE, Mass. — Computer Corporation of America (CCA) took several strides in the fledgling programmer workstation software market last week with the introduction of a prototype workstation-based data base design system, a microcomputer version of its mainframe development environment and an enhanced release of its micro-mainframe link.

"A major problem many companies face is the overloaded mainframe," said Doug Miller, product manager for application development products with CCA, which markets the Model 204 relational DBMS. "One solution to that problem is distributed applications and data base management systems. Another important alternative is to offload applications development work. With these products, developers can download work to a workstation and only use the mainframe when necessary. That will improve productivity greatly."

DB Designer is a prototype workstation-based data base design system developed by CCA's research and systems division for the U.S. Air Force. The system, already in use within the Air Force, will not be ready for general shipment until the fourth quarter of 1986. Miller said the company has not yet decided which commercially available workstation product will be used to implement DB Designer.

According to Miller, DB Designer is currently running on a Jupiter Systems, Inc. J-12 workstation at the Rome, N.Y., Air Development Center and on a similar machine within CCA's research and systems division. On the Motorola, Inc. 88010 microprocessor-based J-12 workstation, DB Designer runs under the University of California at Berkeley's Unix Version 4.2.

Miller said CCA is hoping IBM will make clear its workstation plans or its intentions for an Intel Corp. 80386-based system in 1986, but the company may in the interim host the product on a Sun Microsystems, Inc. or Apollo Computer, Inc. workstation. Miller said the Personal Computer AT is not yet powerful enough to host the system. Pricing for the system has not yet been determined, but Miller said CCA expects DB Designer to cost between $30,000 and $50,000.

"We are announcing the product early to emphasize our strategic direction to use the micro as an extension to the mainframe," Miller said.

Integrated set of tools

According to Miller, DB Designer will provide an integrated set of evaluation, analysis and design tools for the data base creation process. The system analyzes designer-submitted requirements and automatically generates first-cut entity relationship diagrams.

Data models can be developed for either CCA's Model 204 or IBM's DB2 relational DBMS.

CCA's new PC/Workshop is an optional extension of its mainframe Workshop/204 applications development environment that allows users to build or modify applications on an IBM Personal Computer, Personal Computer XT or AT in User Language, Model 204's fourth-generation language.

PC/Workshop includes communications software, which can share the same mainframe portion as its PC/204 link. Model 204 must be running on the host, and the micro must have at least 256K bytes of memory. PC/Workshop will be available at the end of the month for $500 per micro.

According to Miller, Release 2 of PC/204 now supports uploading of files to the mainframe for processing or for archival storage. Release 2 also supports downloading of tables as well as spreadsheets from the mainframe. Release 2 of PC/204 will also be available at the end of the month at $750 per micro.

MIS, Inc.: Loctite pros set up shop

From page 1

that hardware, with the sole exception of headquarters.

If Loctite did convert according to Freeman's plan, it would mark the company's first step toward standardization. Until 1984, the company, which employs 2,500 people and produces such products as Super Glue, operated in a loosely controlled environment — at least when it came to choosing computer equipment.

Consider this setup: In 1981, headquarters replaced a 5-year-old NCR Corp. 201 that was "obsoleting itself," Freeman said, with the HP system. That brought the number of Loctite's hardware vendors to four.

The international offices and Loctite's other U.S. subsidiary, Automotive Consumer Products Corp. in Cleveland, had a hodgepodge of equipment from such vendors as Honeywell, Inc.; IBM; NCR; and HP.

After headquarters converted, these divisions went in search of higher capacity systems. However, none of them went with headquarters' choice. "They tended to formulate their own procedures," Freeman said. Each, in turn, selected the IBM System/38. By last year, headquarters was the only holdout.

"Usually you see it the other way around, with IBM at headquarters and other systems at remote locations," said Niels Schulz, former corporate MIS director of Loctite and now president of Info-Point.

In 1984, Loctite was reorganized and the two U.S. subsidiaries were merged under Loctite North America. In addition, tighter controls on such matters as capital expenditures went into effect across the board, Freeman said.

Schulz, also on the steering committee, understood Freeman's thinking. During his tenure at Loctite, Schulz had grown familiar with the problems of working in a multivendor environment. Even minor things — the varied formats in which reports arrived from the many offices — could turn into headaches.

But now Schulz had an even bigger problem. While he saw the move to System/38 at headquarters as good for the corporation, he did not see it as good for himself. Schulz liked working on HP equipment, and he wanted to keep things that way.

In November 1984, Schulz presented two ideas to the steering committee, which represented a way around the conflict — one concerned Loctite, the other concerned himself. First was his vote for the System/38, which was welcomed by Freeman. But the second idea took the senior vice-president by surprise. Schulz wanted to spin off from Loctite to form his own company. He also wanted to take with him those people in MIS who wished to join him.

> *'When you lose seven people, that's an awful lot of knowledge of the company going out the door.'*
>
> — David Freeman, Loctite Corp.

As important as the desire to stick with HP equipment was to Schulz, there was another reason for his wanting to strike out on his own. Under Schulz, the MIS staff had been developing a decision support software package for the HP 3000. "There was this piece of software sitting there with market potential," Schulz said. He wanted it as part of his new company's offerings.

So the plan formed in Schulz's mind. His new company, which he would call Info-Point, could provide consulting services to companies with HP equipment. Starting off with the mother company as sole client, Info-Point could build from there. It could market the decision support package called Focal-Point. There was also a chance to become an OEM for HP.

Schulz's plan was obviously not Freeman's prescription for happiness. "Quite frankly, [Schulz] wanted to spin off with more people than I had wanted him to take," Freeman said. "And he was also a good employee that I didn't want to lose."

But a fight with Schulz would have been too damaging since the company had decided to go ahead with the System/38 conversion at headquarters. The only option was to negotiate as smooth a transition as possible. Freeman responded to Schulz's November proposal the following January. For the next month, the two hashed out the details. By May 1, the new company, with a total of seven former Loctite people, was officially in business.

Info-Point agreed to provide consulting services to Loctite on a declining basis for the HP system until December. Loctite, while retaining the rights to Focal-Point, agreed to let Info-Point market the software package. As Freeman explained, this gave Loctite the opportunity to make money on Focal-Point without any effort. "Our expertise is not computer software," he said.

As of Jan. 1, any services provided by Info-Point to Loctite will be done so on an assignment basis. This month, for instance, Info-Point will be spending approximately 25% of its time at Loctite, compared with the 100% it gave in May. The Info-Point staff pay was based on the Loctite salaries.

It appears that these details were put together in a clear-cut, simple fashion. But back at the MIS department in Newington, life was far from simple. For starters, when the Info-Point people set up shop, they left an official body count at the Loctite MIS department of only three. This small group had just two months to prepare for the scheduled arrival of the System/38.

William Carson, who had been manager of systems and programming, decided not to join Info-Point. He became MIS manager and overseer of one programmer and one programmer analyst. Carson said there were many reasons — some of them personal — for not joining the spin-off. "It felt to me that the majority of their business would be consulting, at least for a year or two. And I didn't want to be in the consulting business," Carson said.

Instead, he found himself in the business of rebuilding an MIS staff. As spring folded into summer, Carson recruited two project managers, another programmer and a programmer trainee. As of late last month, he was still in need of a programmer analyst.

In the meantime, the hardware arrived in Newington on schedule in July. The going has been slow. So far, Carson's department has transferred only the fixed asset program to the System/38. But the past months have mainly been devoted to teaching the new employees about the business of Loctite and the old employees about the System/38.

From a corporate point of view, the changes Carson's department has undergone have not been traumatic. "When you lose seven people, that's an awful lot of knowledge of the company going out the door," Freeman said. "But obviously we replaced them with IBM people. We may have gotten the best of both worlds."

But others at Loctite said they have felt the impact of all the changes. Michael Fal, who, as manager of accounting operations, calls himself an "interface between accounting and MIS," said the changes in MIS have caused problems. "Obviously the backlog of requests grew and got bogged down," he said. "Certain things that I had on my list of enhancements never got done. Unfortunately, the business didn't stop [during the transition]."

Robert Tartaglia is also an interface of sorts. As manufacturing systems administrator, Tartaglia found the past year to be "a time of confusion." It also added to his work load. "You have to spend more time with new people," he said. "It's knowing who to talk to now to get things done."

Control Data remote services joins the micro revolution

Micro-to-mainframe software key to future

By John Gallant

ATLANTA — The remote computing services industry has been accused of many things in recent years, but innovation has not been one of them.

Control Data Business Centers (CDBC), one of the leading remote computing services vendors, has lately attempted to change that and take on the mantle of innovator. Part of the Business Services Group of Minneapolis-based Control Data Corp., CDBC has decided to embrace the microcomputer revolution, which has taken its toll on key segments of the remote computing market such as time-sharing services and has pioneered the marketing of shared micro-mainframe services.

Spearheading CDBC's drive into the micro age is its Atlanta-based Product Support Center, which develops and maintains the software used by CDBC's 30 processing centers nationwide.

Micros as powerful allies

Roger Cole, general manager of the Product Support Center, said CDBC decided to look at micros as potentially powerful allies rather than foes, thus the move to micro-mainframe software offerings, which company officials candidly admit are the key to the CDBC's future.

In May, the group unveiled a micro-mainframe link jointly developed with National Management Systems, dubbed Orchestrator, that allows companies to tap into the processing power and data of the processing centers on the CDBC network via their microcomputers.

And in September, CDBC announced its Human Resource Management System (HRMS), which combines the organization's mainframe-based payroll service, the Orchestrator link and a micro-based human resources package called HR-1 developed by Mainframe Micros, Inc. Since then, CDBC claims to have signed on more than 50 HRMS clients, the majority coming from among the 15,000 companies that currently use CDBC's remote services.

"We are trying not to be bashful in addressing the changes in the remote computing industry," Cole said. "We asked our customers how to respond to the influx of micros, and with their help, we are staying in tune."

With the aid of the new product offerings, CDBC officials said the group's revenue has grown by 20% this year and sales of key services such as payroll have increased by as much as 25%; the company would not provide specific revenue figures. International Data Corp., a Framingham, Mass.-based market research firm, estimated that revenue growth in the overall remote computing market will hover at roughly 10% for the remainder of the decade.

CDBC, originally known as the Service Bureau Corp., was once owned by IBM but was sold in 1973 to CDC as part of the out-of-court settlement of an antitrust suit against IBM. Cole has been with CDBC since the IBM days. Today, he oversees a staff of more than 100 programmers and product support specialists housed in a sleek, modern building in a suburb of this Southern metropolis.

In addition to the fledgling micro-mainframe services, the Product Support Center maintains and enhances CDBC's primary applications products. They include payroll, tax filing, human resources, general ledger and financial reporting and accounts receivable and payable — in all, more than one million lines of code, Cole said.

Applications specialists man a hot line that serves technical personnel at the processing centers who, in turn, take on that role for clients.

A proprietary monitoring system developed by the Product Support Center enables Cole's staff to assess whether processing centers have successfully implemented new software releases within 24 hours of their distribution. "We think providing one set of software to all our customers is a real benefit," Cole said. "Our nationwide clients wouldn't have it any other way."

But while Cole's Product Support Center is helping to move CDBC into the micro age, his group's approach to technology is decidedly dated.

Atlanta facility houses IBM 4331

The Atlanta facility houses an IBM 4331 mainframe, as do most processing centers, under VM/CMS and DOS/VSE with VSAM and two aging CDC Cyber 120 minicomputers dedicated to word processing and programmer support. While the rest of the industry argues over the merits of Cobol vs. fourth-generation languages, the Product Support Center does all its programming in assembler.

"We have a large investment in assembler software, and we have stayed with that language," Cole said. "Processing efficiency is of paramount importance. We provide software with many user-selected options, and to develop that software in anything but a lower level language would be impractical. Efficiency is also the reason we have stayed with VSAM rather than a newer data base management system."



Staff relocation provokes angry response

Some Bank of America employees would rather quit than switch

By Jeffry Beeler

SAN FRANCISCO — Systems professionals at the U.S.' second largest bank have reacted angrily to a relocation plan that would move them from their current downtown offices to a distant suburb east of San Francisco Bay.

Displeasure over the 25-mile move to Concord, Calif., designed to bring all systems development staff together at one site, has already prompted some Bank of America employees to quit for jobs at other companies elsewhere in the city. Additional staff members said they are scouring the job market for suitable openings. A third faction of the bank's systems specialists, meanwhile, limited its response — at least for the moment — to loud grumbling.

"Lots of people working there are telling the bank, 'To hell with you, we don't want to leave,' " according to a local personnel recruiter who spoke only on the condition that he remain anonymous.

The recruiter's comments were echoed by many other sources, both inside and outside the bank. The bank did not directly respond to queries about the griping.

But even Bank of America's severest detractors readily acknowledge that the relocation is by no means entirely lacking in virtues. Launched in October and scheduled to continue through 1986, the move promises to consolidate a staff of programmers, analysts and other systems specialists who have hitherto been divided among more than a dozen downtown locations. The transfer affects only the bank's development personnel, not its production people, who will stay in the organization's two data centers in San Francisco and in Los Angeles.

Moreover, by no means does the bank's systems organization universally regard the move to the new development center as an unmitigated disaster. On the contrary, most of the employees who already live on the Concord side of the bay greeted the relocation enthusiastically, according to a programmer who still works for Bank of America. Residents of the bay's eastern shore reportedly account for roughly a third of the bank's development staff.

But among the employees who live west of San Jose or on the San Francisco peninsula or in Marin County to the north, the move has engendered widespread animosity. "Most of the people who live way down the peninsula in places like Sunnyvale or Los Altos have already resigned," according to a systems analyst currently attached to the Bank America Systems Engineering (BASE) group.

Nor is the BASE staff member alone in his observation. "A friend and former co-worker of mine," a recent Bank of America defector recalled, "quit her job recently because she didn't want to move to Concord."

Whether the dissatisfaction will lead ultimately to large-scale defections remains to be seen. "Some people threaten to leave but never work up the energy to look for another job," noted a systems professional who recently quit the bank partly out of dissatisfaction with the relocation. "Others will do something about it."

Another factor that may discourage an employee exodus is the current softness in the MIS sector of the Bay Area's job market. "If you go out looking for new positions right now, they'll be hard to find," the former Bank of America worker said.

Moreover, the bank offered each member of its systems staff an extensive package of incentives calculated to hold resignations to a minimum.

But even incentives and a weak local job market may prove inadequate to prevent Bank of America's systems professionals from quitting in droves. In fact, the organization's own internal estimates predict a loss of "several hundred" systems specialists within the next year or so, according to a local source with close ties to the bank.



Bank of America's move to a new Concord, Calif., development center will lengthen the daily commute for many of its systems employees, who previously worked in downtown San Francisco.

Asked to confirm the source's report, an official Bank of America spokeswoman downplayed the estimate as "highly speculative" and strongly hinted that any such forecast would be extremely premature.

Another source — one of several Bay Area headhunters who agreed to be interviewed in exchange for anonymity — expects the institution to lose 20% to 25% of its 3,500-member development staff because of move-related discontent. The bank spokeswoman said the estimate was excessive but conceded some personnel loss may be almost inevitable because of the move.

To make matters even worse, a disproportionately large number of the potential defectors are likely to come from the top 10% of the bank's development work force, according to yet another local DP talent recruiter.

A similar view was voiced by the ex-Bank of America systems employee. "The top-rated people generally feel they have more opportunities and are less afraid to take their chances, whereas those who aren't as highly regarded often lack confidence," the source said.

If systems employees, especially the best ones, resign in sufficient numbers, some of the bank's internal application development projects may suffer. One West Coast consultant, in fact, has estimated the price of the relocation at 92 man-years of lost development effort.

Although hundreds of bank systems employees have yet to commit themselves one way or the other, the prospects of avoiding a mass defection among their ranks appear to be slowly fading. Some, though certainly not all, of the local recruitment firms specializing in systems professionals are reporting higher-than-average volumes of inquiries from Bank of America job candidates.

In addition, the rumblings of discontent from the bank's development staff have attracted the attention of its nearby competitors, some of which have done their best to exploit the turmoil for their own advantage. Federal Reserve Bank of San Francisco, for example, recently ran a series of classified newspaper advertisements extolling the institution's downtown job openings and appealing unabashedly to systems employees uninterested in relocating.

The ads, which have been discontinued, drew a "very good response" from several of the city's prominent employers, including Bank of America, according to Terry Leja, who works in the Federal Reserve Bank's employment office. Leja, however, refused to discuss the ads further.

Much of the resistance to Bank of America's ongoing move stems, of course, from a desire to avoid rush-hour traffic and time-consuming treks to work. For many of the employees, the new development center in Concord would create a personal hardship by greatly lengthening the distance of their daily commutes.

But one source who works for BASE advanced an alternative theory for the bank's internal dissension. Many of the systems employees who are griping about the move and thinking of jumping ship are doing so out of dissatisfaction with their current jobs.

"In many cases," the source said, "the systems people with the highest level of business analysis, design and problem-solving skills are being ordered to do schlock work because the bank doesn't know what to do with them. So some of the employees I've talked to are just using the move to Concord as a convenient excuse to go look for work elsewhere."

The same source also voiced the minority opinion that Bank of America secretly welcomes many of the departures as it struggles to cut its budget and return to profitability after a $338 million quarterly loss last June.

Though not the first Bay Area business relocation, the Bank of America effort stands apart from its predecessors for at least two reasons. First, as the area's largest employer of MIS professionals, the bank is tackling relocation on an unprecedented scale. Second, the move coincides with a major internal shake-up that culminated recently with the resignation of Max Hopper as executive vice-president in charge of BASE [CW, Nov. 11].

After 16 years Project/2 still cranks along

By Mitch Betts

BALTIMORE — Utility industry executives last week celebrated the 10th anniversary of the Project/2 software users group, and several users praised the 16-year-old project management software as a mature and reliable old workhorse.

"I'm told that Project/2 is written in an archaic language. But as a user, that doesn't bother me because the software works. It just cranks along," commented Joseph S. Fowler, staff engineer for cost and schedule management systems at Northeast Utilities in Hartford, Conn.

At Baltimore Gas & Electric Co., host of the 10th Annual Project/2 Utility Users Group Conference, the software has been used for so long — 10 years — that it would be tough to change to another package, according to Fred A. Lange Jr., supervisor of the utility's scheduling unit. "We have 75 people trained in Project/2, and it would cost a lot to retrain them," he said.

"It's really not the same software after 10 years because it's been changed and enhanced so much," Lange added.

Utilities use the software from Project Software & Development, Inc. of Cambridge, Mass., for the scheduling and cost management of multibillion dollar power plant construction jobs and for critical maintenance projects.

Users interviewed at the conference said Project/2, while not perfect, has a full range of project management features (including graphics and a relational data base manager) and that Project Software & Development provides good support.

Boston Edison Co. has used Project/2 since 1977 and, like many other users, obtained the package on a three-year renewable license, according to Gerald A. Mata, senior project management engineer. Boston Edison conducts a formal review of Project/2 and its competitors each time the lease is about to expire, and each time Project/2 wins the evaluation even though it is more expensive than its imitators, he said.

"It has every feature we need and more. And you get good support when you need it, along with an established user base," he said.

Robert L. Daniels, founder and president of Project Software, said one reason for the success of Project/2 is the short-term licensing arrangement, which keeps Project Software responsive to user needs.

Now that the product is so mature, some customers are opting for 10-year licenses, he said. Project Software & Development's software has roughly 80% of the utility market, fueling the firm's growth from a $5 million to a $25 million company, Daniels said.

With the falloff in utility construction and declining sales to the remote computer services industry, Daniels said new growth is expected from the aerospace and defense industries and from the new microcomputer version of Project/2.

Sytek expands line with broadband local-area networks

Emulation capability for 30 types of terminals

By Paul Korzeniowski

MOUNTAIN VIEW, Calif. — In an attempt to move away from its dependence on the whims of IBM, Sytek, Inc. announced today two product lines that link its Localnet 20 series of broadband local-area networks to large asynchronous and synchronous computer systems.

"Users who work with a variety of systems will no longer need to have a variety of terminals cluttering their desks," claimed Jeff Tonkel, director of marketing at the company. "They'll be able to access any computer on our network by using only one terminal."

One product line, the System 3000, supplies terminal emulation capabilities for approximately 30 types of asynchronous terminals, such as the Digital Equipment Corp. VT100. The product also uses coaxial cable to attach to an IBM 3270 series controller and supports IBM 3278 or IBM 3279 terminals or personal computers equipped with those types of terminal emulation cards.

Tonkel stated that the 3000 line is geared for large corporations that have a number of disparate devices. Sytek market research estimated that half of the corporations in the U.S. fall into that category.

The second line, the System 7000, is targeted for use in true Big Blue shops for it connects a Localnet 20 to IBM controllers but does not supply support for asynchronous hosts.

Some Sytek competitors, including Ungermann Bass, Inc., offer similar types of network connections. Tonkel stated that a principal difference is that the Sytek product offered more flexibility for adding users to a network. Users can be added on either a single basis or in groups of 16. "Our competitors force companies to add only eight or 16 users at one time. That process can be a very expensive proposition," Tonkel claimed.

Sytek was the OEM that IBM chose for its PC Network. Much of Sytek's growth in the last few years has come from that contract. Sytek has stated that half of its $70 million in revenue for fiscal 1985 came from the IBM contract. Approximately 75% of Sytek's manufacturing production has been devoted to the IBM PC Network, according to Kim Myhre, an analyst at International Data Corp., a Framingham, Mass., market research firm.

However, the network has not sold as well as IBM or Sytek had anticipated, according to the analyst. Myhre estimated that Sytek has shipped IBM 140,000 PC Network kits, IBM has sent 20,000 of those kits to distributors and only 7,000 have been sold.

To compound the problem, earlier this year IBM announced a local-area network, IBM Token-Ring network, that was developed by an IBM division. With the introduction came speculation about IBM's willingness to renew its contract with Sytek.

Myhre said he thinks that Sytek is attempting to loosen its ties with IBM by more fully developing its own relatively successful product line. The company claimed that it has sold 1,000 networks, which support close to 250,000 users.

To an extent, Tonkel agreed with Myhre's assessment. "We are attempting to shift the company away from OEM sales to sales of our own products," he said.

There are six 3000 series products available: single-port controller interface unit ($895), modular controller interface unit ($1,850), single-port 3274 interface card ($695), single-port terminal interface unit ($595), modular terminal interface unit ($1,600) and single-port 3278 interface card ($395).

For the 7000 series, products and prices consist of single-port controller interface unit ($775), modular controller interface unit ($1,850), single-port 3274 interface card ($475), single-port terminal interface unit ($475), modular terminal interface unit ($1,600) and single-port 3278 interface card ($325).

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acknowledged Jim Kinlan, the director of technical marketing at Lotus.

"We did not anticipate some of the user concerns that cropped up," he said.

■

Computerland last week was released from all claims against it in the battle with Micro/Vest. Last March Micro/Vest was awarded a 20% share of the retail chain plus punitive damages as a result of a promissory note signed by Computerland founder William Millard. Now Millard and his daughter Barbara will resign from the Computerland board, and the company will be taken public at some point; the Millards and their holding company, IMS Associates, Inc., will continue to appeal the part of the decision that concerns the stock they own, but they will not be required to post a $25 million bond.

IF YOU DON'T BUY YOUR NEXT PRINTER FROM BDS, DON'T LET YOUR MOTHER SEE THIS AD.

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BDS, the world's largest integrator of Dataproducts printer mechanisms, has temporarily slashed prices by 20%* for new customers. This introductory offer is designed to show you why thousands of customers and over 10,000 installations have made BDS the world's largest supplier of Dataproducts-based plug-compatibles.

Sure, it's easy to confuse Ma (or Dad, or any other non-technical person) when you talk computers. LANs, communications protocols, and multiprocessor load balancing even stretch the brain of your above-average wizard. Not so with your heavy duty-cycle, run-em-year-in-and-year-out, industrial-strength printers.

A few weeks ago it would have been really tough to justify to your mother why you paid 30-50% more than you had to. If you act now, you'll be saving more like 40-69%. Not only do non-BDS customers pay more for the identical printer mechanism from DEC, DG and HP, but they get much less intelligent printer controllers and fewer options in the process.

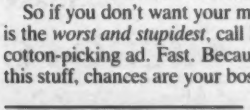
Oh? You think you can snow Mom on how smart your printer electronics has to be? Try this on for size: Just ask your computer salesperson to help you move the printer s/he sold you to a competitor's system. That sales rep will look at you as if your mother wasn't from this planet. Not so with your BDS salesperson.

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So if you don't want your mom thinking her *best and brightest* is the *worst and stupidest*, call BDS today. Or deep-six this cotton-picking ad. Fast. Because if your mother can understand this stuff, chances are your boss can,too.



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Mountain View, Ca 94043

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*The price cuts are on 300, 600 and 1000-lpm band printers. The IBM 3262 Model A1 line printer for the System/34 and System/36 is rated at 467 lpm and costs $17,690. Why not save 52% on a 600 lpm printer and controller from BDS? A 3203 Model 5 printer for your System/38 is rated at 1050 lpm and costs $39,850 from IBM. You can save a whopping 69% on a Dataproducts-based workhorse from BDS. HP is another example. A 600-lpm, full-font printer from HP costs $18,560. You can now save 43% on the same printer mechanism with a smarter BDS controller, and receive a bonus electronic vertical forms control option. And you can save 49% on a 1000-lpm printer. Copyright © 1985 by BDS Corporation. IBM, DEC, DG and HP own numerous registered trademarks. Advertising by the Rick Bennett Agency, 408/258-2708.

General Electric buys RCA

Broad implications for communications

By Clinton Wilder

In a historic marriage of two electronics giants that both helped pioneer the mainframe computer market and later abandoned it, General Electric Co. last week announced its intent to purchase RCA Corp. for $6.23 billion.

The merger will form an electronics leviathan only slightly smaller than IBM. Although the future management and structure of the hybrid company were unclear at presstime, one leading analyst saw an immediate fit between GE's Information Services Co. (Geisco) and RCA's international telex and satellite links.

"The ability of RCA to offer its communications customers the data base and electronic mail of Geisco on a worldwide basis through its Globecom network is very significant," said Harvey Poppel, a mergers and acquisitions specialist with Broadview Associates in Fort Lee, N.J. "GE will also get Cylix, the packet-switching network that RCA has not pushed as aggressively as GE has pushed its Geisco services."

Some observers said they felt the merger was ironic considering GE's inconsistent moves into the telecommunications arena. "GE seemed to have difficulty deciding whether it wanted to be in that business or not," said Jack Reis, vice-president of marketing for Case Communications, Inc., a maker of network systems and products. In recent years, GE established task forces to consider entering communications segments such as satellite and microwave links but backed away each time, according to Poppel. "Many of the things that RCA brings to the table are things that GE has rejected," he said.

Poppel noted that the marriage should solidify the future of Rockville, Md.-based Geisco, which, according to rumor, GE was looking to sell. Geisco underwent a major reorganization earlier this year and laid off 400 workers [CW, June 10].

Computer Consoles cuts 200

By Clinton Wilder

ROCHESTER, N.Y. — Computer Consoles, Inc. said last week it will lay off approximately 200 people in January and reduce its work force by as many as 350 positions in the next six months.

Computer Consoles, which will report its fourth straight quarterly loss for the current quarter, will dismiss 150 of the 700 workers employed at its main facilities in Rochester. Fifty additional employees will be laid off at plants in Reston, Va., and Irvine, Calif., and 100 to 150 other jobs will be eliminated by attrition in the first half of 1986. The layoffs will affect virtually all job levels.

"We currently employ 1,450 worldwide, and 1,100 is the size we need to be to support our current revenue base and return to profitability," said spokeswoman Judy Rubien. Computer Consoles will post an operating loss of about $5.7 million in the current quarter, and its actual loss will be greater due to expenses associated with the layoffs.

The work force reduction is Computer Console's third and largest layoff of the year. The minicomputer and office systems company trimmed 50 jobs in March and another 70 in August.

Big user nixes shielded wire

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supplier of synchronous terminals, reversed its cabling policy and endorsed use of nonshielded wire for terminal support [CW, Nov. 4].

Initial movement in that direction came last year when IBM introduced the Cabling System, which supported IBM 3270 peripheral devices with less expensive shielded twisted-pair wire. In October, IBM conceded that even less expensive nonshielded twisted wire could be used in many terminal applications.

Standard twisted-pair wire, it was commonly believed, did not offer the shielding necessary to protect data signals from outside electrical interference generated by things like fluorescent lights. Furthermore, there was some concern the nonprotected wire would radiate energy when carrying high-speed, high-power signals, which could interfere with other electrical devices.

Knowing little about those concerns probably worked to the advantage of David Boehms, manager of Northern Telecom's office systems planning, who was charged with finding an alternative to coaxial cable. Boehms had 15 years of data processing experience and little to no background in engineering.

Northern Telecom, Boehms said in a recent interview, was determined to find a way around using coaxial cable in its new building. The company was in a quandary. It planned to install its own Meridian integrated voice/data product line within a year after moving into the building. That system uses twisted-pair wiring, and Northern Telecom did not want to spend roughly $170,000 to install coaxial cable to support its synchronous terminal population in the interim.

Boehms set out to experiment. Using a coaxial-to-twisted-pair adapter developed by a colleague, Boehms connected a 3270-type terminal to a controller with 1,700 feet of twisted-pair wire and tested it for a month. The link, which supported IBM's 2.34M bit/sec. Type A terminal protocol, worked fine, Boehms said.

Based on that experience and on further tests, Northern Telecom went ahead with plans to wire its seven-floor building to support 150 3270-type terminals; 160 Northern Telecom 585 devices, which are minicomputers that also provide some 3274 controller capabilities; and 70 Northern Telecom Meridian 4000 terminals, which emulate IBM 3278 displays and have individual integral digital telephones.

Today the facility has a computer room on the second floor that houses eight 29X series Northern Telecom cluster controllers, which are plug compatible with IBM 3274 controllers. These controllers are connected to a central punch-down block in the building's telecommunications room with a cable containing 600 wire pairs. That block — a board where each twisted-pair wire in the building is terminated — is connected to a wiring closet on each floor with a separate 600-pair cable.

Offices on each floor are wired to their respective wiring closets, which also contain punch-down blocks, with a six-pair wire. Of these wires, two pairs are intended for use with Northern Telecom's digital telephones — one as a telephone line and the other for power — and the other pair can be used to support 3270-type terminals. This leaves three spare pairs for other applications.

Data, voice travel in same cable

Data and voice travel down to the telecommunications room in the same cable, but not over the same wire. Once there, the pairs supporting the terminal are split off and routed to a controller across the hall. These controllers are connected to an IBM 3081 processor in Ann Arbor, Mich., via Northern Telecom's private packet network.

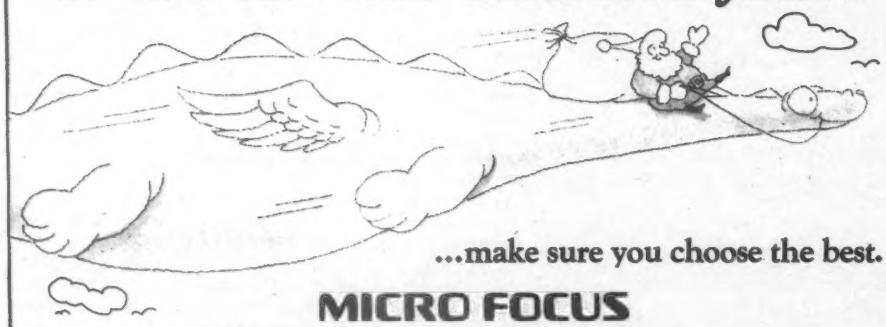
In ongoing tests, Boehms has used as many as five out of six wire pairs simultaneously: two to support an SL-1 telephone; two more with a Meridian 4020 integrated voice/terminal; and one for a Northern Telecom Display phone, which is a combination asynchronous terminal and analog telephone. All devices performed well.

Although Boehms has not tested bit-error rates, there have not been any noticeable problems. Users, in fact, reported that screen refresh seemed faster than when the devices were supported with coaxial cable.

Another benefit of the system is ease of relocating equipment. Like other cabling schemes, the wiring system Northern Telecom installed enables terminals to be moved as easily as telephones. After relocating the device, a wire jumper is used in the wire closet to connect it to the proper pair running down to the computer room.

Although new to the world of information processing, high-speed data on twisted-pair wire is not new, analysts said. "Telephone companies have been supporting megabit speeds over twisted pair for a long time," noted Ian Angus, president of Angus Telemanagement Group, Inc., a consulting firm in Toronto. "In normal applications, twisted pair should be adequate at distances ranging up to 2,000 to 3,000 feet."

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DEC customers expect BI grouping products next year

Microvax II cluster may impact VAX line

By Donna Raimondi

The impact of the Microvax technology on Digital Equipment Corp.'s mid-range VAX products may dramatically increase early next year when the company introduces a concept called BI clustering, which is known to users as Bus or Backplane Interconnect clustering.

DEC will not say when or whether the concept will be announced for its Microvax II, but references continue to surface.

BI would be a boon to thousands of Microvax II users in that it will probably allow the Microvax II to share resources with other VAX systems.

When questioned about the term, the company told *Computerworld* it does not comment on unannounced products.

A DEC salesman told customer Lawrence Berkeley Laboratories in Berkeley, Calif., which owns a large VAX cluster, that the BI product would be available "sometime in the future."

Attendees at the DECUS users group meeting in Anaheim, Calif., last week heard references to BI clustering at several sessions. When DEC was asked to explain the term BI, the company said they do not discuss products prior to introduction.

Three DEC users told CW that BI will be announced relatively soon. One predicted a Jan. 29 date, and two claimed that BI — along with two new processors — will be announced at the April DECUS meeting in Dallas. The users claim to have proposals that include the new product.

Expensive to configure

At present, the Microvax II is expensive to configure with enough storage space to do the kind of applications the microprocessor-based machine is capable of performing. Clustering capabilities provided by BI would allow the Microvax II user to access data on any VAX system in a cluster.

"There is no basic reason they would not be able to do clustering on the Microvax II," said Will Zachman at International Data Corp. in Framingham, Mass.

However, DEC has to position its VAX-11/750 and 11/780 before it springs a clusterable Microvax on the market.

The BI Microvax, which will probably be called a Microvax III, will reach at least into DEC's mid-range, Zachman said, killing off the market for the VAX-11/750 and probably even for the VAX-11/780. The initial Microvax products reportedly have already severely dampened demand for the VAX-11/730.

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Bank puts blame on software flop

From page 1

porary software patch enabled the bank to process $8 billion in securities late Nov. 21, but it failed at 12:30 a.m. the next day, and the full-scale redesign was completed by 2 a.m. By 12:15 p.m. Nov. 22, the system resumed full processing.

Bank documents indicated that the computer program was developed by an outside software development firm, which assisted in the software patching effort. The firm was not named in documents or testimony.

Congressional delegate Walter E. Fauntroy (D-D.C.), chairman of the U.S. House Subcommitee on Domestic Monetary Policy, criticized the bank for its high-risk strategy in trying to conduct regular business while assuming that the computer glitch would be fixed by the end of the day.

"This type of behavior, together with the size of the loan, the largest ever made through the discount window by the Federal Reserve, raises grave concerns regarding the safety, soundness and effectiveness of the payments system," he said in a statement that opened the hearing.

Chairman of the Federal Reserve Board Paul A. Volcker cautioned against overdramatizing the incident, but he pointed out that the Federal Reserve has long urged banks to shore up their computer systems.

To encourage better backup systems, Volker said, it may be necessary to establish a special penalty interest rate when exceptionally large borrowing is caused by the institution's own computer problems.

The Bank of New York's chairman, however, said the $5 million interest payment on the emergency loan was sufficient penalty. "Indeed, $5 million represents a very substantial penalty for our stockholders, officers and employees." Bacot said.

Bacot also stressed that the bank's computer system has an excellent reputation and is used as a model by some Federal Reserve Banks. Ironically, the software changes made in March were intended to make it possible for the system to handle more transactions — up to 36,000 issues.

The Bank of New York is the nation's 18th largest bank and one of the two largest clearers of government securities in the country.

DEC users sticking with 8600, looking for Microvax cluster

Microvax II cluster capabilities rumored

By Maura McEnaney

ANAHEIM, Calif. — The recent release of Digital Equipment Corp.'s VAX 8650 and the company's emphasis on clustering its systems failed to generate any great enthusiasm among users who gathered in Anaheim last week.

An estimated 10,000 people were to attend the Digital Equipment Corp. Users Seminar (DECUS) and the nearby Dexpo West '85, a show for DEC-compatible equipment vendors sponsored by Expoconsul International, Inc.

The DECUS meeting, often used by DEC for major product announcements, was rather uneventful following DEC's earlier announcement of its 8650 superminicomputer [CW, Dec. 9].

But users attending Dexpo talked of future DEC announcements that would bring cluster capabilities down to the Microvax II. That announcement could coincide with a DECUS meeting set for April in Dallas, sources said.

Although the 8650 is said to improve upon the 8600's speed by about 44%, some 8600 users said they would stick with their current configuration, particulary because of the $125,000 conversion cost.

The University of California at Berkeley's Lawrence Berkeley Laboratory has one of the largest DEC clusters in the country. According to systems manager Edgar Whipple, the lab purchased five 8600 machines last summer.

Addressing an upgrade to the 8650s, Whipple said, "$125,000 sounds like a lot to me." When the lab previously converted its VAX-11/780s up to the 11/785, "we were dismayed at the price at first. But if they say it's going to be 50% faster, I would tend to believe them," Whipple said. Nevertheless, the laboratory is not likely to be an early user of the 8650 because it does not need the added capacity.

"I would be surprised to see us take five 8650s. I don't think it's justified yet. It may be in another couple of years, but by then there may be a few new processors out that would be more suitable," he said.

"I think that the 8650 upgrades are going to be difficult to come by for a while," said Nigel Haslock, a consultant for AGS Computers, Inc., who configured a DEC cluster for AT&T Information Systems.

He noted that the difference in price between the 8600 and the 8650 is the same as the cost of upgrading an 8600 to an 8650. "That in itself means DEC doesn't want people to stop buying 8600s," according to Haslock.

DEC's cluster architecture gives users the ability to combine existing machines to create more powerful processors, which the company claims are as powerful as IBM's largest mainframes. But, users say, DEC's software pricing policies on clusters leave a lot to be desired.

"DEC is going to have to come out with a more flexible pricing policy," said Stephen Tihor of New York University's (NYU) Academic Computing Facility. "The current system is not fair." More than 500 students and researchers now access NYU's DEC cluster, consisting of a VAX-11/780, 11/785 and two 8600 machines. The current DEC pricing structure requires software to be licensed for each machine on the cluster.

Treating software working on a cluster as a single system may be one solution to the software licensing problem, Tihor said.

"With the whole DEC philosophy of distributed computing, they are going to have to come up with a Digital licensing architecture." ■

At Dexpo West '85, product displays were headlined by expanded memory for the Microvax II, data base software and hardware peripherals.

Product introductions at the show were mostly limited to enhancements of existing product lines.

Among those introductions, Oracle Corp. announced that its relational data base management system now runs on VAX clusters. According to the company, the announcement marks the first time that Vaxcluster users can share information within a data base management system that is compatible with IBM'S DB2 and SQL/DS systems.

The license price for Vaxcluster support is licensed for each Oracle-resident VAX in the cluster and ranges from $24,000 to $96,000.

Chip industry indicator looking up

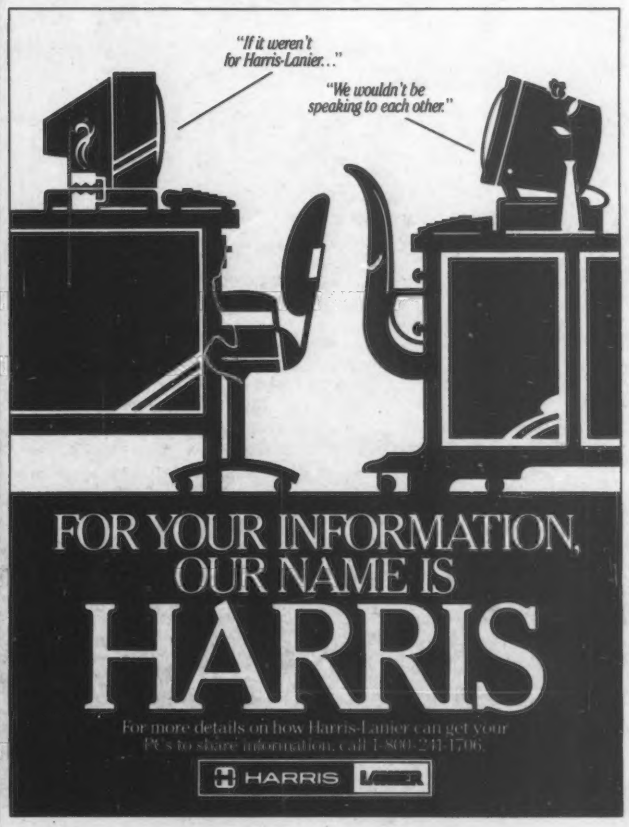
SAN JOSE, Calif. — The hard-hit chip industry received another ray of hope last week when the Semiconductor Industry Association (SIA) announced that its leading indicator for November reached its highest point in more than a year.

The SIA's book-to-bill ratio hit 0.90, meaning vendors in the U.S., Japan and Canada received $90 in new orders for every $100 worth of semiconductors shipped. After hovering around 0.75 for most of the year, the ratio rose to 0.82 in October.

For the three-month period ended Dec. 1, the industry's average of $535.1 million in orders per month represented a 6% increase from the three months ended Nov. 1. But the current order rate remained 21% below the same period in 1984.

— Clinton Wilder





MIS, DP managers make do in absence of net standards

Local-area networks fill communications gap as industry waits

By Peggy Watt

DALLAS — Corporate MIS and DP managers are anxiously awaiting industry networking standards but are more than willing to develop their own with third-party options, according to several attendees of a managers' seminar last week.

During a conference for MIS/DP managers sponsored by Future Computing, Inc., attendees said networking their microcomputers and other systems is a major concern, and in some cases, they are developing their own standards. But managers made it clear they are still looking for the industry to establish those standards.

"Companies will fill the standards vacuum if the industry doesn't set them, particularly with local-area networks," said Karl Kendall, manager for personal computer support at Metropolitan Life Insurance Co.'s New York information center.

Companies are interested in communications at several levels, the managers stressed. Viable micro-to-mainframe communications is the aspect of interest to Dot Autrey, second vice-president of Lomas & Nettleton Financial Co.'s information resource center.

"What we really need is a slick interface. I'd like to see more vendors addressing this important service," she said.

The network wish list offered by Billy Dusek, vice-president of the Federal Reserve Bank of Dallas, included electronic mail and document distribution capability, file sharing, peripheral device sharing and "any-to-any" communications.

His institution's system juggles most of those needs with 180 terminals and 137 personal computers hooked up to an IBM 3084.

"It doesn't work as cleanly as I'd like. We're using all IBM devices, and even they don't always talk to each other."

Eyeing local-area nets

Metropolitan Life's Kendall said his organization is examining several local-area networks now, with an eye toward integrating most of the 1,400 personal computers it will have installed by the end of this year. The company also expects almost to double that personal computer population to 2,200 by the end of 1986.

"We haven't got a good answer there, but we certainly have a very strong need," he said. He said the company expects to design some of its programs in order to cope with particular productivity needs, standards and costs. He is examining code generation on a personal computer workstation connected to a host.

"We're using PCs from the standpoint that they are our productivity tool," he added. "The software isn't perfect, but it lays the groundwork for the future.

The users themselves are taking the opportunity to voice their preferences at Metropolitan Life, Kendall said. The organization formally created a "partnership in quality" between the information center and departmental support personnel to help with evaluations and plans.

But the end users are not absolutely calling the shots.

"Control is the absolute key to integration. If we're ever going to put it together, somebody's got to have control," said Charles Feld, vice-president of management services for Frito-Lay, Inc. People may have and voice their software or hardware preferences, but "you can buy whatever you want. You're just not going to get any support" from MIS.

Representatives of several other companies said they, too, did not prohibit purchase of software not on the approved list, but that support was spotty. "MIS needs to take a leadership role," said Randall Pletzer, assistant vice-president for information systems at Southwestern Life Insurance Co., of Dallas.

Future Computing President Egil Juliussen said he has found different parts of a firm will have different strategies, that the all-encompassing information center that handles computing, communications and other technological office supply needs does not exist yet in most firms.

For efficient payback, some firms, such as Frito-Lay, have opted to buy a base terminal and plug in their own enhancements from third parties, including add-on cards, memory, even additional drives. "By the end of a decade, putting a PC on a desk and tying it into the network is going to be as common as installing a telephone," Feld said.

Juliussen said the microcomputer will become the workstation of choice, since the personal computer workstation can handle most functions of dumb terminals as are needed to communicate with host or other systems or perform stand-alone tasks. To no one's surprise, he also predicted the IBM Personal Computer based on an Intel Corp. 8088 family — probably incarnated in the 80286 or 80386-powered system in the next decade — will remain entrenched in the corporate office.

But users also like their Apple Computer, Inc. Macintoshes. Even Future Computing prepared its program's graphics with a Mac.

Attendees nodded and related stories of around-the-clock use of the Macintosh in their own offices.

Metropolitan Life's information center's three Macintoshes among 14 micros are "in the highest demand," Kendall said.

But, Juliussen cautioned, even the slick interface is not enough to cause upheaval in the personal computer-entrenched corporation.

"A new interface must offer functionality and compatibility to prompt a switch," he said. "If it's incompatible, it must be five to 10 times better to get somebody to switch."

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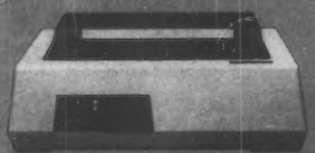
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HARRIS LANIER

West Germany reexamines private-line data regulations

By Bryan Wilkins

WASHINGTON, D.C. — West German telecommunications regulators, who have clamped strict controls on foreign firms' ability to use private lines in transborder data shipments — affecting U.S. firms such as banks and computer services firms — have signaled their intention to reexamine their policies in talks with U.S. negotiators.

A high-level U.S. delegation returning from West Germany last week said West German restrictions on the installation of open-ended leased private lines that connect to foreign points will continue but reported that the West Germans proposed a flat-rate private-line tariff that is less restrictive.

The ban by the German Bundespost, West Germany's postal and telephone authority, on the installation of leased private lines unless they terminate in a computer has hampered U.S. firms from entering the West German market.

Smaller data processing service firms are especially affected by this ban, according to Philip Onstad, a member of the U.S. delegation and a representative in the Washington, D.C., office of Control Data Corp.

Onstad said last week that West German Post Minister Christian Schwarz-Schilling told U.S. negotiators who traveled to West Germany on a fact-finding mission that the Bundespost was willing to consider approval of a new type of leased-line tariff in which charges would be based on the amount of time the line circuit was used.

From the U.S. perspective, this move by the West Germans was a positive development. "In the past, the Germans have been adamant on restricting private installations unless they ended in a computer, which was affecting U.S. firms greatly," Onstad said.

The second part of the tariff proposed by the West Germans would permit the connection of the private line to other types of terminal equipment, including the public telephone network, electronic mail and public data networks. This feature was responsible for the optimism expressed by the U.S. delegation on its return.

WORLD DIGEST

Computerworld News Service

FRANKFURT — The foremost West German electronics industry association is working to encourage European manufacturers to support General Motors Corp.'s Manufacturing Automation Protocol (MAP), a means by which factory automation equipment from various vendors can communicate.

The Frankfurt-based Zentralverband der Elektrotechnischen Industrie e.V. announced late last week the creation of a MAP committee and stressed the importance of defining standards for computer integrated manufacturing.

NIJMEGEN, Netherlands — The Dutch public telephone network took the first step toward completion of its Integrated Services Digital Network late last month when the network's first five digital switches were installed. The switches, to be operational before the end of the year, were supplied by AT&T and Philips Telecommunications N.V.

The Dutch Postal Telephone and Telegraph already uses two L. M. Ericsson digital switches for international telephone routing and for special services. Earlier this year, it chose APT, an AT&T and Philips joint venture, as the main supplier for the digitalization of its network.

TURIN, Italy — Digital Equipment Corp., which recently announced a joint venture with Comau S.p.A. of Italy's Fiat group, said this week that other alliances with European firms are also in the works.

Digital Equipment S.p.A. and Comau last week announced the creation of Software E Systemi per l'Automazione Manufatturiera, which will develop integrated automation systems for Europe's medium-size manufacturing companies.

FRANKFURT — Wang Laboratories, Inc.'s West German subsidiary, Wang-Deutschland GmbH, said last week that it had earned $81.2 million in the past fiscal year but still suffered an overall loss largely because of the strength of the dollar. It did not specify the amount of the loss.

According to the subsidiary's managing director, Dieter Baszista, the company will return to profitability this year.

PEKING — The Chinese government is said to be considering limits on semiconductor imports because a chip glut in China is hurting domestic producers, the *China Economic Daily* reported this week. According to that newspaper, the total number of semiconductors available for sale in China is expected to reach 135 million units by the year's end, up 82 million from last year.

China's 1985 domestic semiconductor demand, however, has been estimated at no more than 170 million chips, with domestic production accounting for 52 million units, said the Chinese Ministry of Electronic Industry.

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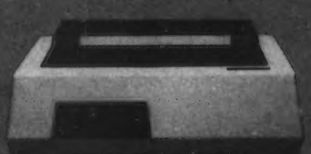
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HARRIS LANIER

VIEWPOINT

EDITORIAL

Making a wish list

It's that time of year again when folks gather around the fire, lift a glass, give quiet thanks for the foregoing year — and wish for those things they would like to be different *next* year. For DP/MIS managers, the following might be some of the hopes and dreams for 1986:

- A way to turn the backlog into a Yule log and watch it burn to a crisp.
- An easy-to-use workstation that can access a network via software.
- Fourth-generation languages that are more than relational data bases with utility tools tacked on.
- A simple, plug-in wiring scheme.
- Key vendors deciding on some broad communications standards.
- On the other hand, standards for *anything*.
- Truly natural natural language.
- Truly intelligent artificial intelligence.
- A clean, simple and inexpensive way to hook into IBM's maze of protocols in the office — from Systems Network Architecture to LU6.2.
- Managers and professionals who actually use the neglected micros sitting on their desks.
- Some method for managing distributed processing other than throwing darts at an organizational chart.
- Funds to send all end users to computer camp next summer.
- A crystal ball capable of telling which vendors will still be in business five years from now.
- Federal trade laws that reflect concern for computer users instead of industry lobbyists.
- Some way to stop IBM representatives from behaving like International Business Mannequins.
- Technology cycles that last at least as long as the products on which they run.
- Documentation that describes what software actually does, not what vendors hope it will do.
- Disappearance of turnkey systems that take longer to implement than they did to build.
- A group of users who realize that it takes more than one seminar to know how to run an MIS department.
- A return to 1956 and an uneventful Christmas with Perry Como, Doris Day and the company's only computer.

Notes & observations

VDTs and the question of their potential health hazards are back in the news. The newest survey provides yet more inconclusive data on the effects of VDTs on those who work with them, and the Data Processing Management Association is taking a hard line against legislation now pending in several states that would regulate employees' exposure to VDTs (see story page 2). Although legislation is probably the least effective remedy if there actually are health risks in continued VDT exposure, we believe that professional organizations have a responsibility to continue probing for answers. The DPMA, instead, appears to be more interested in stopping the questions. That is not responsible.



LETTERS TO THE EDITOR

DP staff layoffs just a Band-Aid for upper level mismanagement

The article "DP personnel new victims of corporate cuts" [CW, Nov. 18] reported layoffs of DP personnel by a few of the large New York-area companies because upper management decided their DP shops were top heavy with excess personnel.

The editorial "Don't cut here" [CW, Nov. 18] warned that upper management needs to be made aware of the danger to the company's survival caused by the cutting of data processing department operations.

All these conditions result from one basic cause that has plagued data processing during the last 25 years. That cause is mismanagement.

The mistakes being made are repeated because the upper level executives responsible for those mistakes and the managers selected to fill DP slots have buried their heads in the sand by refusing to admit and recognize that serious shortcomings exist throughout the ranks of data processing management.

Firings, the lack of perception of the DP role and the feeling that too little is being done by the DP department result from the failure to face facts about data processing.

Unfortunately, the data processing field will continue to deteriorate as long as certain principles and suggestions remain ignored by "professional" DP managers, or those who call themselves that, and by the executives responsible for the poor selection of managers in the first place.

No more than 5% of all data processing installations are being managed in a professional manner. That percentage will not be improved as long as essential factors for successful DP management are ignored.

The signals being sent out through the DP industry during the last year and a half indicate that strong mismanagement rules the data processing world. The signals of mismanagement that executives and DP managers hoped would disappear by ignoring them have instead accumulated to the point of exasperation.

So now they believe that the cutting of staff — which is just a Band-Aid — will correct these problems. What is really needed are professional managers in data processing.

John Callahan
Arlington, Texas

Performance not only a question of language in design of data bases

Articles recently published in *Computerworld* have called into question the performance of production applications programmed in fourth-generation languages. The articles implied that if the application had been written in Cobol, performance would have been satisfactory; that fourth-generation languages are not cost-effective; and that fourth-generation languages cannot replace third-generation programming tools such as Cobol. The conclusions and the implications are both largely incorrect.

Part of the problem, as was suggested in the Product Spotlight "Language barrier: The fourth generation at work" [CW, Nov. 11], is terminology. Because the term "fourth generation" is used to describe anything from a simple language for ad hoc queries by untrained end users to an entire tool kit that enables data processing professionals to build complex, high-volume, recovery-sensitive, transaction-processing applications, there is little wonder that confusion exists.

What is important is to understand the task at hand and to select the appropriate tool, or tools, for the job.

What must also be considered is that Cobol by itself is simply not suitable to address either the needs of the end-user community or the productivity requirements of the MIS department. In the latter environment, it has to be supplemented by an array of development tools, such as command-level CICS or map-generators.

That is why organizations are justifying a fourth-generation approach and realizing the benefits of greater programmer productivity, increased high quality in application function, reduced maintenance and training costs and valuable prototyping capabilities.

The speed with which an application can be developed is a very important criterion, but the accuracy with which the program logic is developed has an equally significant benefit.

For these reasons, the somewhat heavier resource requirements that such products have can be accepted by those responsible for implementing systems.

There are occasions when Cobol is still neces-

See **PERFORMANCE** page 23

For more letters, turn to page 18

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VIEWPOINT

Office automation: the next generation

By Raff Ellis

The latest glamour product in a long line of a high-tech innovations is the integrated voice/data workstation. This product is being touted as the answer to the office automation problem — how to get more office workers to use computer products. The pressure to increase usage comes not only from vendors of these products but also from forward-thinking management in user organizations.

But, you say, office workers are using computer products. They have been using data terminals and word processors for years, and now personal computers have taken their place alongside them. The penetration in business the last few years has been phenomenal, and today there are approximately five million workstations in use.

READER'S PLATFORM

So who is using them, and what are they doing? First of all, personal computers are sitting on nontraditional computer users' desks, being used by people who don't know how to write programs and by many who don't even know how to type.

But these users quickly mastered the use of tools such as spreadsheets and word processors. The personal computers are used mostly for constructing financial models, typing documents and accessing host computers.

Now that sales have slowed a bit, the buyers of this technology are beginning to ask questions about use, cost-effectiveness and the long-term influence on corporate information processing. Also, doubts have been raised about the applicability of personal computers in the upper echelons of big business. After all, there aren't that many senior executives or managers, relatively speaking, that use personal computers productively in their daily work.

It is precisely because of this lack of acceptance that the industry has extrapolated the need for the next generation of office products. The problem is that there are widely divergent views of what these products should do, how they should do it and what they should cost.

The variety of vendor responses indicates some measure of confusion as to what is needed and how these needs should be satisfied. Just what problem are we trying to solve anyway?

Office work consists of a set of tasks. These tasks range from answering the phone to performing calculations. Let's face it, the office is an unstructured, unsystematic environment. The problem is to find a way to improve the efficiency of the white-collar workplace by increasing productivity.

Such improvements can come through document preparation and dissemination, arranging meetings, accessing information and so on. The time that is saved can then be used to improve decision making and to increase the volume of work performance.

The office marketplace is easily misunderstood by computer vendors. Products are largely designed and developed by hardware and software engineers. These people do not work in an office; they work in a laboratory. Office workers perform many tasks of which programmers and engineers are unaware.

Traditional thinking does not respond well to problems that are unsystematic or unstructured. Traditional products will not do the job either. The personal computer can be classified as traditional because its heritage is computational and is but a subset of the office automation solution, as is word processing.

The personal computer fails mainly because it is not integrated, does not allow speedy transition between functions, does not incorporate voice functions and is not easy to learn and use. After all, the office workers that will use these products are not computer aficionados. To them, the computer is a tool, not a preoccupation.

Executives are commonly mentioned as primary candidates for integrated voice/data workstations because voice communications plays such a prominent role in their daily work. But focusing on the executive is a mistake because it neglects some basic facts about the corporate environment.

Executives do not work alone and, in fact, are among the most supported individuals in large enterprises. They work with secretaries and administrative assistants, staff professionals and managers who report to them each day. In fact, the executive is part of an office work group, and this group is the market the integrated voice/data workstation must address.

It is a difficult market to satisfy because it requires a much more global approach than the individual workstation market. It is no longer enough to provide word processing and spreadsheets. Vendors will not be able to get away with hyping old products. A few of the following things will be required:

- A technology leap with architectures that allow true integration of voice and data in a reliable and maintainable way.
- Integrated software that is easy to learn and use and that allows rapid transition between functions and the use of common data across all functions.
- Supporting software that adds significant value to the procedures they replace.

The users are talking about and are waiting for these products. When these devices appear, with the right price and performance characteristics, the market will accept them with open arms.

Ellis is founder and president of Insytec, a Winter Park, Fla., manufacturer of executive workstations.

Standardizing the industry

Open approach could halt high-tech slump

By Scott McNealy

High technology's high fliers have finally landed in Silicon Valley. Companies are laying off, factories are shutting down and quarterly profits have turned into mounting losses. Japan, the economy, venture capitalists and a host of others get blamed.

The computer industry, however, has not adequately owned up to the portion of the problem that is its own making. Without such critical self-appraisal, the high-tech recession won't be readily turned around. Learning the lessons and rectifying the mistakes, however, can put the industry back on the trajectory of growth that has been fueling much of the recent U.S. economic renaissance.

The biggest issue the industry must confront is the desparate need to standardize. From the buyers of multimillion-dollar supercomputers down to the small-business executive trying to learn to use a personal computer, all levels of customers are sick and tired of a situation in which one part of their system can't talk to another, and new technology makes obsolete what went before.

READER'S PLATFORM

> *Customers are suffering from a severe case of technology indigestion.*

To be blunt, customers are suffering from a severe case of technology indigestion. Orders for new products are likely to continue tapering off until manufacturers show a real willingness to relieve that ailment.

For years we have heard high-tech companies argue that the industry is too new or experimental to standardize. At best, that attitude reflects a narrow engineering focus willing to sacrifice the customer's convenience and budget for the last word in bells and whistles. At worst, the refusal to accept standards is a cover for pure greed.

By using proprietary systems rather than standardized ones, some companies are consciously trying to lock their customers into brand loyalty. They oversell the promise of their companies, hoping customers will never catch on to the trick being played on them.

A responsible manufacturer in today's environment needs to concentrate on the "on ramps" and "off ramps" of the product. Will it be compatible with what the customer already owns? Will the customer have to learn a whole new set of procedures for efficient operation? Will tomorrow's advances in technology be easy to integrate with what is being offered today?

The best way to be sure of a "yes" answer to those questions — and to instill customer confidence — is to design products around accepted industrywide standards at all the interfaces where one technology will need to talk to another. The AT&T Unix operating system is one example of such a standard that can be shared by all classes of computer equipment from supercomputer to desktop.

In every niche of information processing, superior standards have indeed evolved. They may not be perfect, but that's not the point. If you wanted to be a technology purist, you could blame the standards used today to generate electricity or broadcast television signals.

The task then, is for the computing industry to listen for the standards that customers are demanding and to accept an open approach to systems building. Customers must be assured that they can easily incorporate products of their choosing from many different vendors as well as from tomorrow's products — all with minimum disruption to their large existing investments in technology. Otherwise, most of them will continue to sit and wait until things become better — and the industry will continue to stagnate in the meantime, losing more ground to foreign competition.

Acceptance of the "open systems" approach, however, requires a break with the mind-set of the recent entrepreneurial revolution. Most entrepreneurs want their companies to be nothing short of the next IBM. They insist upon their proprietary systems in the vain hope that, like IBM, their way of doing things will become the world's standard and will bring them untold billions in profits.

Dreaming of building an IBM-size company is inappropriate at this stage of the game. The time has come to take the blinders off, to look around at what everyone else in the industry is doing and to look forward to the future. Instead of trying to be the engine, companies should focus on the part they are best suited to play — even if it's only a spoke on a wheel.

The computer industry has tried to lead the customer around by the nose for too long. It has ignored customer appeals for standards and easy integration of technology, concentrating instead on its own shortsighted marketing strategies.

For an industry in deepening stages of slowdown and shakeout, the time has come to stop blaming broad macroeconomic forces we cannot control. Our focus ought to be closer to home on the problems we can solve. In that context, it is high time the whole industry began listening more closely to what customers are saying, and it should make sure they get what they want. That process alone will go a long way toward combating the current high-tech slump.

McNealy is chairman of Sun Microsystems, Inc., a Mountain View, Calif., manufacturer of workstations for technical professionals.

VIEWPOINT

The relational DBMS debate rages on . . .

Codd blames vendors of data bases for confusion over relational theory

John Cullinane's letter to the editor [CW, Oct. 28] has publicly exposed the continuing hostility of Cullinet Software, Inc. management to the relational DBMS approach — and thereby has given many in the field of data base management systems cause to wonder how relational the product IDMS/R can be. Is the "R" merely creativity in advertising in place of creativity applied to the quality of the product? It is time for Cullinet to take a clear-cut stand that is consistent with the realities of its products and to stop trying to mislead the public.

There are several things wrong with Cullinane's response to my two-part article, "Is your DBMS really relational?" [CW, Oct. 14 and 21]. Over the past 10 years or so, Cullinet has placed all of its eggs in the Codasyl basket — in spite of the resounding defeats the Codasyl Data Base Task Group suffered in other public debates since then. After several years of significant growth and profits resulting from this Codasyl-oriented policy, Cullinet finds itself in the unenviable position of being unable to support the rather sudden and substantial change in the DBMS market, namely a decided preference on the part of buyers for DBMS that are authentically relational.

Cullinane's assertion that my article is really intended to defend the IBM dual data base strategy is not only totally incorrect, but it is also laughable because on several occasions I have publicly stated that this duality is neither in IBM's interest nor in its customers' interest. This strategy is rather like declaring assembler language and Cobol or PL/I to be equally strategic.

A second reason I have openly opposed this strategy is that, even if there were any sound reason to support it, competitiors of IBM in the DBMS field such as Cullinet take advantage of it by asserting that, in contrast to IBM, their customers need only one data base management system.

Now that the marketplace has suddenly turned in favor of the relational approach, Cullinet finds itself in a highly ambiguous and inconsistent position. It wants to convince potential customers that its product IDMS/R fully supports the approach.

However, there is a lot more to relational technology than merely supporting tables and adding the letter "R" to the name of the product. Therefore, it is not easy for a vendor to portray the impression of mastering relational technology if it has not.

Cullinane's remarks about performance are equally ludicrous and depend entirely on a conveniently incorrrect quotation from my article. Tests have shown that at least one relational DBMS product — and very likely two from distinct vendors — can outperform both IDMS and IDMS/R. Now, at this early stage in the development of relational DBMS products, it is all too easy for a vendor to produce a relational DBMS that performs poorly.

This does not mean that poor performance is a necessary consequence of choosing the relational approach — a myth that Cullinane appears anxious to perpetuate. It does mean, however, that it is necessary for a DBMS vendor's technical people to study the hundreds of technical papers that have been published on this subject and to do at least some research and prototyping themselves.

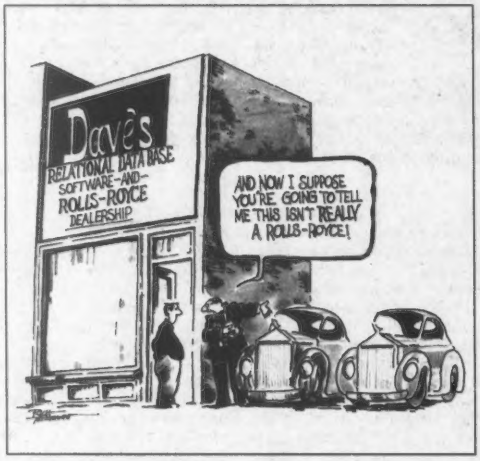
I have encountered all of the executive-style criticism before. When executives experience a favorable run of profitable years, and this has been the case with Cullinet, they convince themselves that the good fortune is entirely because of their executive skills. Thus, Cullinet executives have chosen to ignore the relational research and development of the past 15 years or more.

A letter to the editor from Lee Gruenfeld [CW, Nov. 4] displays an attitude toward theory that is unfortunately all too common in this field of software developments. Instead of examining a theory to determine if it has practical application, anything with a theoretical flavor is assumed to have no practical value.

I suspect that the land surveyors in ancient Greece were hotly opposed to the plane geometry that Euclid introduced because it threatened to convert their black art into a more systematic and rigorous enterprise. It is the assumption by practitioners that anything theoretical cannot be practical that keeps the field of software development from becoming a branch of engineering based on solid principles. It is fortunate for us today that Euclid's work survived and even now finds great use.

Let me assure you that each feature of the relational model was included in the model only if it had clear practical value. Further, as every IBM Guide users group member can confirm, the collection of requests made to IBM by early users of DB2 was strongly correlated with the features of the relational model not implemented in the first release of DB2.

One final point: I have never taken the position that, if a DBMS is not fully relational, it cannot be considered to be relational at all. It sounds as though this purpose would be simply to avoid doing work that is necessary in today's market. The whole purpose of my article was to show the extremity of the differences in support for the relational model provided by DBMS products from different vendors — products claimed to be relational data base management systems — and to help the public sort out this confusion by providing a relatively easy way of evaluating how relational these products are.



It may help your readers to understand why I went to the trouble of developing the article if I contrast the relational approach to data base management with the fourth-generation language flag, which many vendors are now flying.

There is no fourth-generation language definition worth its salt, let alone any theoretical foundation. James Martin's purported definition fails to mention what capabilites a fourth-generation language should have — it is quite inadequate to say that it must express tasks 10 times more concisely than Cobol. A mere change in Cobol syntax could probably accomplish that goal, and incidentally, the language APL would qualify as a fourth-generation language.

Thus, any vendor can claim to provide a product that supports a fourth-generation language, and there is a no basis for checking or challenging such a claim. With the relational approach, however, the relational model can be used, is being used and will continue to be used to check vendor claims. This action will protect all the work that has gone into the relational approach from being undermined by vendors' inadequate implementations and extravagant claims.

E. F. Codd
President
The Relational Institute

When making systems investments, users choose reliability over speed

John Cullinane's letter to the editor [CW, Oct. 28] on a highly interesting two-part article by E. F. Codd, "Is your DBMS really relational?" [CW, Oct. 14 and 21] is a bit worrying to me because it seems that Cullinane is familiar neither with customer requirements nor with data base technology.

The data technology part he explained by admitting that Codd's article is "about the silliest" he has read. He only forgets that Codd's article is about relational data technology, and I hope Cullinane will realize that there is a slight difference between the relational concept and networking.

Cullinane is trying to corrupt Codd's article — and rules — by saying it is "analogous to building an airplane according to an aeronautical engineer's design specifications, and once completed, he finds it will not fly."

The analogy is excellent; there is only one part that is wrong: the conclusion. Data base technology is really "flying." There is no question about that. Cullinane is talking, or trying to talk, about speed.

I leave that point for others to decide, but I think the airplane analogy may be worth elaboration for just a moment. I do think most passengers appreciate airplanes that are safe and reliable and reach their targets. And most think it's better late than never.

So speed is not the only vital point here. What's important is to be part of a technology that is present and will be present in the future, thereby protecting the large investments users are putting in data base systems today. In that context, we should read Codd's article. I give credit to *Computerworld* for printing it.

Rolf Lind
Oslo, Norway

Theory vs. reality: the same goal from two different perspectives

It seems the recent argument in *Computerworld* over relational data base systems is once again a demonstration of the differences between a theoretical and a practical viewpoint.

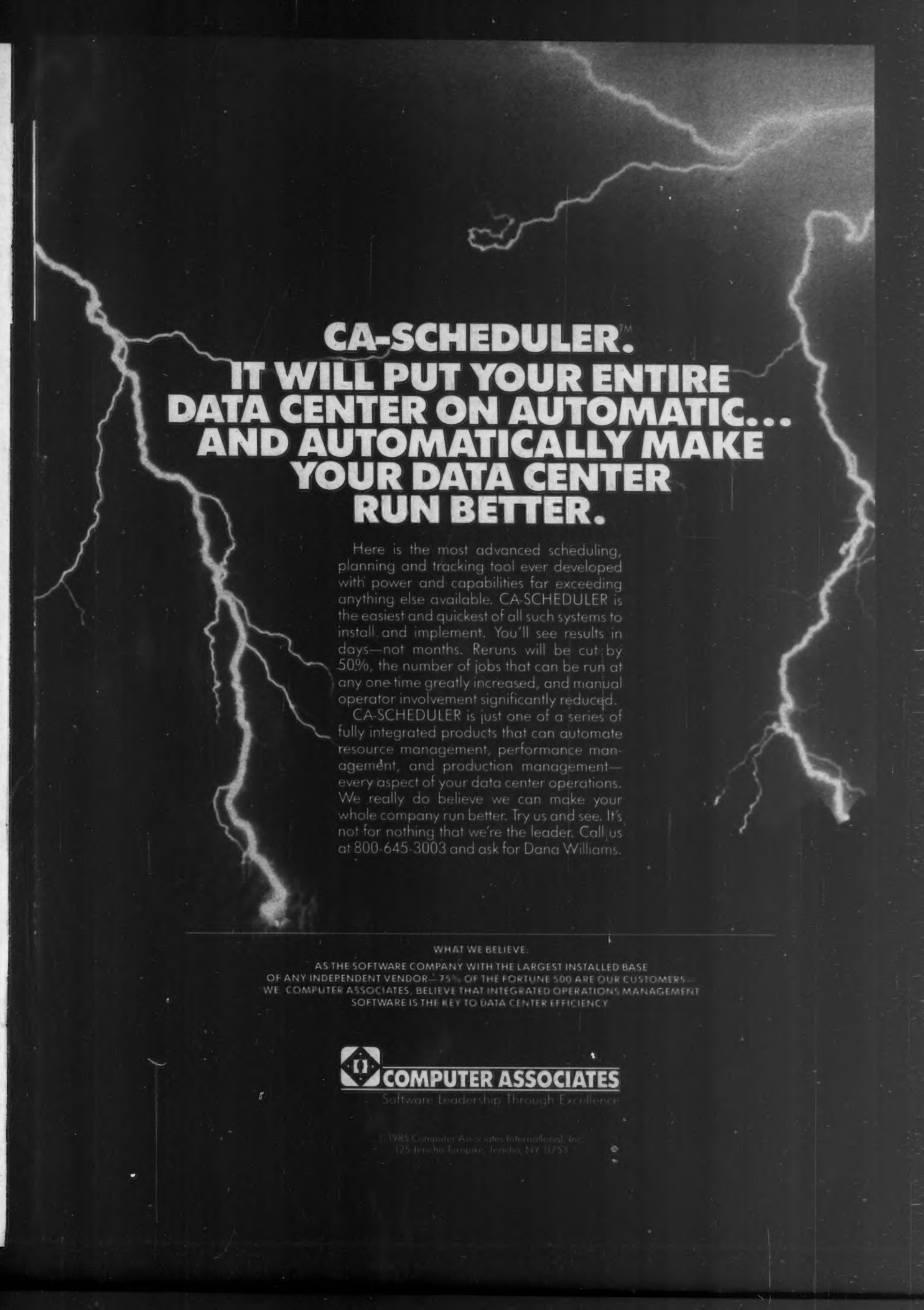
First, E. F. Codd presented 12 rules and other features of a fully relational DBMS in his two-part article "Is your DBMS really relational?" [CW, Oct.14 and 21]. It is clear that there is no better authority on this subject than Codd; hence we can easily accept his article as a means of comparing a vendor's DBMS with the fully relational model.

From the other viewpoint, John Cullinane is a proven leader in the DBMS field. Judging by the growth of Cullinet Software, Inc. during the last 15 years, we can safely assume his products have been accepted by industry as valuable tools that can help solve corporate software requirements in acceptable time frames. The Cullinet DBMS is expanding its capabilities to include the relational approach but at the same time keeping the performance formula that has made it so successful.

Both viewpoints are working toward the same goal, to satisfy corporate needs, but from opposite directions. One has an excellent model and must implement a DBMS with appropriate performance considerations, the other must adapt its performance DBMS to fit the model if it wishes to be considered fully relational.

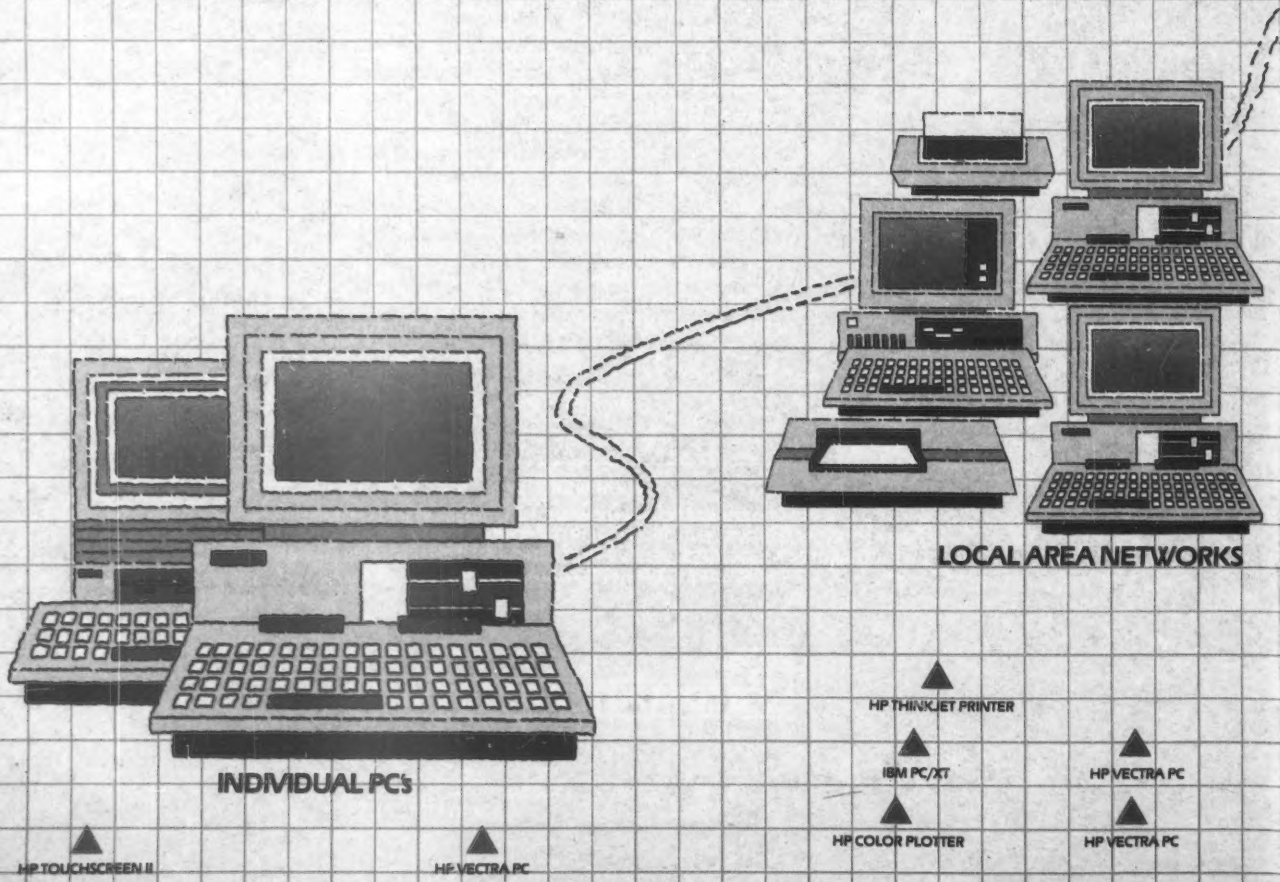
Finally, when consultants such as Joan Boroff make statements in her letter to the editor that "90% to 97% of all applications can be supported by the transaction processing capabilities of today's authentic relational DBMS" [CW, Nov. 18], we should all be aware of two major concerns. First, from what source are such statistics gathered? And second, the main goal for corporate users is for all of their applications to be supported by the same DBMS at the same time with aceptable performance measurements. No relational DBMS has proven to industry that it can do this.

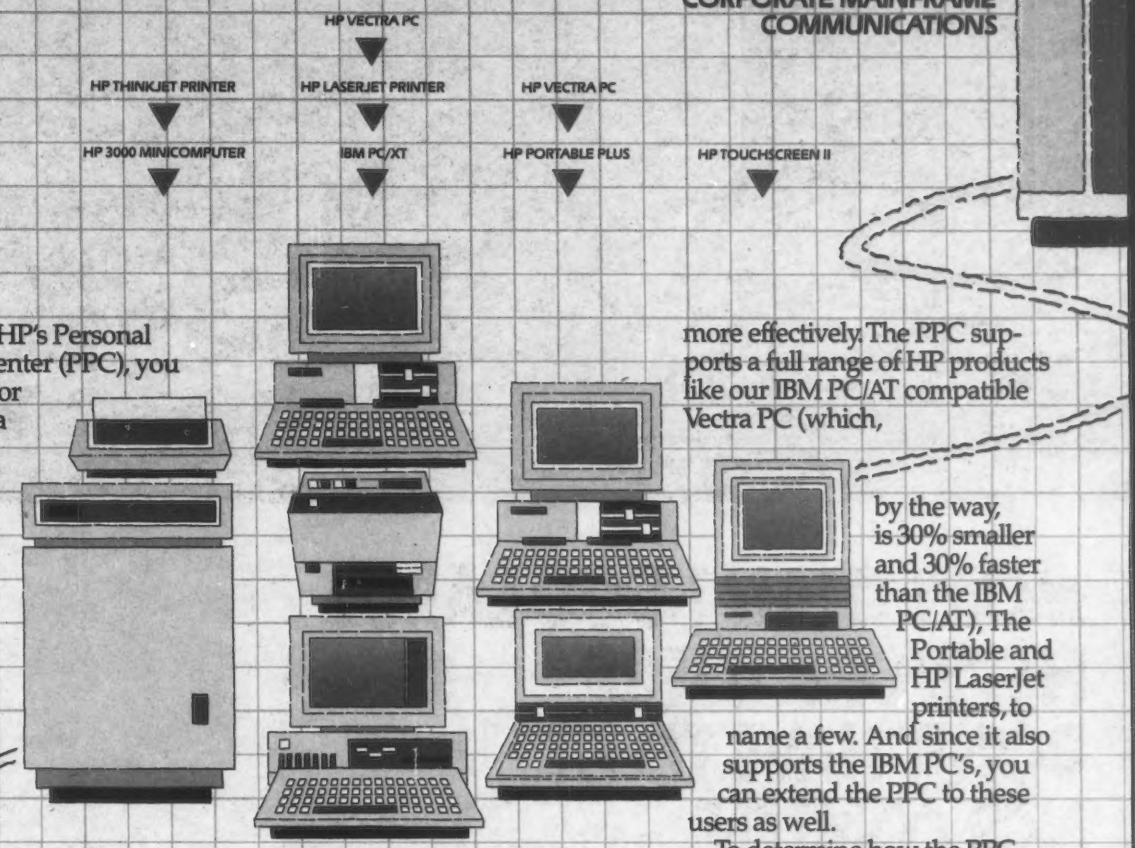
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Performance not only question of language

From page 16

sary. In the same way that assembly language was used for performance-critical functions years ago, a combination of Cobol and the fourth-generation language should be used for certain very high-volume applications that support a large number of terminals and that require very fast response time. Also, many fourth-generation languages do not support batch processing nor can they be easily justified for the implementation of batch applications that have rigid turnaround constraints.

The role of a good data base design to support the application requirements must be considered: Performance is not merely a question of language.

The requirements of the business application must come first, where balancing trade-offs between production and development costs is a means to that end. Blaming a fourth-generation language for the failure of an application to perform acceptably is like blaming the computer: It is too often a convenient oversimplification.

The acceptance of fourth-generation languages for addressing production applications is growing fast. The only area where lower level programming tools get better marks than fourth-generation languages is in faster execution in carefully constructed performance-critical applications.

In the future, high-productivity fourth-generation languages will be used to build high-performance production applications, but Cobol and PL/I will stay where they are today. Because of the overwhelming productivity benefits it offers, the time for a judicious adoption of the new generation is the present.

Martin A. Goetz
President
Applied Data Research, Inc.
Princeton, N.J.

Multisession software: MVS misconceived, SNA missing

As any MVS systems programmer knows, the MVS restriction concerning address space page faults that is described in "Multiple-session software emulates a messy desk" [CW, Nov. 18] is applicable only to those products that were not designed for multiple tasks. Unfortunately for many CICS users, the preferred CICS environment is currently a product in which normal application transactions, competing with passed-through session traffic, will impact both activities in the exact manner for which the article criticizes central switching products.

Similarly, in the preferred TSO environment, the article dismisses passed-through session overhead while neglecting to discuss the potentially large impact upon TSO swapping and overall system performance from keeping the entire TSO address space resident while nonpreferred applications are being accessed.

Unmeasurable overhead, together with the increasing user requirements for multiple-session capabilities, creates some potentially serious exposures for an approach based upon the preferred premise — 75% to 25% — that it won't be used very much. Our own studies indicate that the point at which TSO passed-through overhead exceeds that of a properly designed single address space is closer to a 95% to 5% split.

A more conspicuous absence in the article is the lack of any discussion about the network considerations related to session switching — not even a mention of IBM's Systems Network Architecture (SNA).

Probably the most significant point that the article makes is an inadvertent one: There are no shortcuts in the implementation or the evaluation of a truly usable multiple-session product. A great deal of MVS and SNA expertise, as well as extensive testing and benchmarking, are necessary to distinguish premises and promotional literature from performance. Users will verify that the distributed switching product will provide a wide range of multiple-session and session management benefits with none of the MVS performance or SNA traffic problems of either the preferred or central switch products described by the author.

Albion J. Fitzgerald
Network Products Director
Telemetrix, Inc.
New York

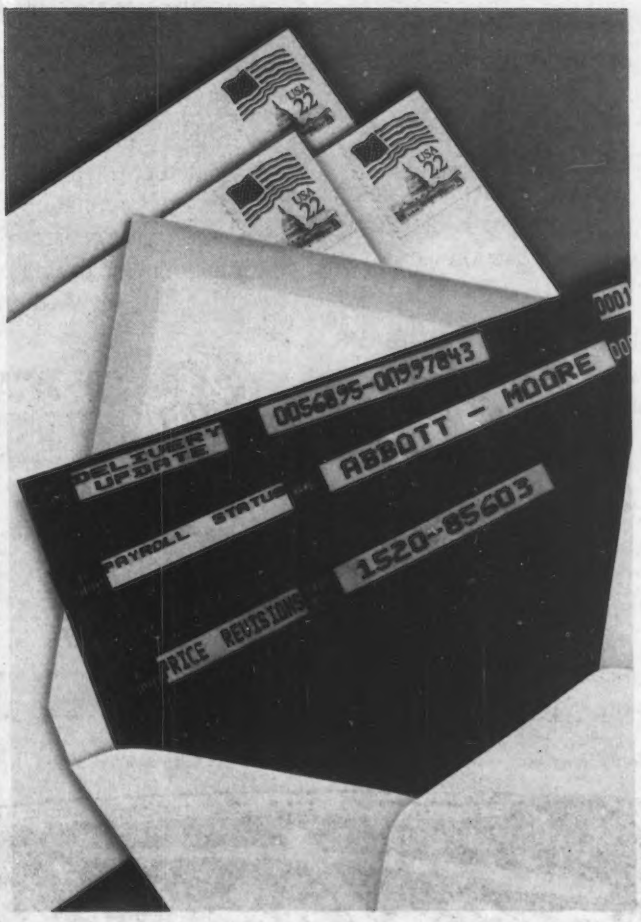
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SOFTWARE & SERVICES

SOFTLINE
Thomas O'Flaherty

IBM's LU6.2 coming of age

The computer industry is only now beginning to understand the implications of IBM's LU6.2, also known as Advanced Program-to-Program Communications. IBM's statement of direction fitting LU6.2 into the Systems Network Architecture (SNA) universe was made three years ago. But the pieces are just beginning to fall into place.

When implemented, LU6.2 allows intelligent devices and programs operating on these devices to establish direct peer-to-peer communications, bypassing the host as required. This is in contrast to current practice, which requires host control over an SNA network. Host control exists because a basic assumption of SNA was that there would be two classes of devices: hosts, with powerful processors and large amounts of storage; and terminals, with trivial amounts of local processing and storage.

This view of the world never left much room for minicomputers. At the time of SNA's birth, IBM did not have a strong market position in medium-size computers. The Personal Computer has changed a great many things, including IBM's views on what is an appropriate relationship among devices in a network.

LU6.2 recognizes that processing — and, consequently, storage — may take place at many points, and these processing points should be able to make

See **IBM'S** page 32

O'Flaherty is a principal at Information Service Strategies in Hackensack, N.J., and a regular contributor to Softline.

TI looks ahead with Focus

Programming language improves productivity

By John Desmond

DALLAS — Information Builders, Inc.'s Focus fourth-generation language is as useful as data is scattered at Texas Instruments, Inc.

The Information Systems and Services department of TI, which relies heavily on Focus, has encountered some minor flaws in the product. But, overall, Focus has offered a vast productivity improvement over Cobol.

TI has seen productivity gains of 10:1 to 100:1 in programming with Focus vs. Cobol for end-user ad hoc reporting and querying. "It's really quite overwhelming," TI Information Center Manager Glenn Fischer said of the gain.

TI has taken steps to allow Focus users access to the company's many data bases, distributed throughout departments. Information center staff members have defined 150 of the corporation's major production data bases to Focus. "Our Management Systems [central DP] brothers have assisted us in getting those set up so the masses can use them like crazy," Fischer said.

A reporting application that takes an hour or two to develop in Focus would literally take months to turn around in Cobol, he said. "Focus is particularly good at taking data from multiple systems and data bases and producing reports combining that data. To do that in Cobol is a real pain."

TI's experience with the market-leading fourth-generation language belies criticism that such products are used only for toy applications. TI installed Focus in early 1983 as an end-user tool. "Focus is not a Cobol replacement for operational systems. It is used extensively for prototyp-

See **TI** page 26

SOFTWARE NOTES

CGA's Top Secret to change hands

The $25 million package. CGA Software Products Group, Inc., vendor of Top Secret, the most widely used security software for the IBM MVS environment, has agreed to sell the package to Computer Associates International, Inc. for $25 million. A Computer Associates spokeswoman said the Jericho, N.Y.-based company will acquire existing Top Secret license agreements from CGA and will employ an unspecified number of CGA employees associated with the product. Top Secret is currently installed in more than 800 DP shops worldwide. The spokeswoman said closing of the transaction is subject to the satisfaction of several unspecified conditions. The move was seen as strength-

See **NOTES** page 28

DNS releases editing package

By Paul Korzeniowski

ST. LOUIS — Data Networking Services, Inc. (DNS) has announced DNS Editor, a package billed as a replacement for IBM's TSO/ISPF.

A spokesman said its DNS Editor was designed for a virtual environment and supports up to 25 IBM MVS users per address space or 200 IBM MVS/XA users for each address space. DNS Editor features support for IBM JES/HASP jobs, IBM ISPF-compatible screens, a complete line editor and interfaces to packages such as Pansophic Systems, Inc.'s Panvalet. The spokesman claimed the product performs significantly better than TSO/ISPF.

The package's editing capabilities include entry and updating of information stored in partitioned data sets, locating text strings, deleting and displaying lines, on-line help, windows, logical tabbing and

See **DNS** page 26

INSIDE

An automated system development methodology for DEC VAX computers is unveiled by Index Technology Corp./**26**

The National Bureau of Standards completes a prototype program to link incompatible tools for CAD/**28**

NEW THIS WEEK

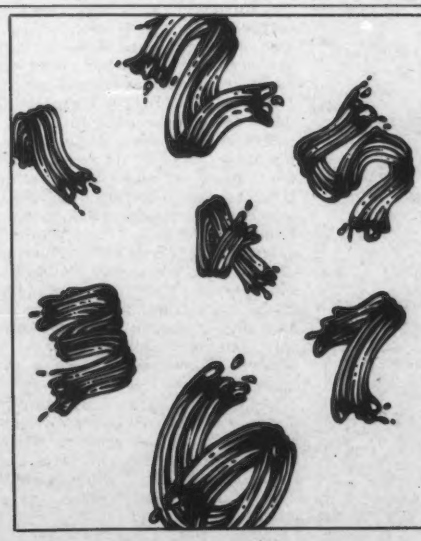
- Burroughs announces Diebold emulation package for RT750
- Sperry offers Suprema maintenance system

For more on these and other new products, see pp. 63-79.

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System development tool out for DEC VAX

Aids programmers, systems analysts

By Paul Korzeniowski

CAMBRIDGE, Mass. — Index Technology Corp. has announced a version of Excelerator, its automated system development methodology, for Digital Equipment Corp. VAX computers. The package, XL/Design Integrator, was designed to aid programmers and systems analysts in the design and maintenance of applications.

XL/Design Integrator supplies a subset of Excelerator functions. The package's data dictionary stores data structures, record definitions, element descriptions, process logic, screen definitions, record layouts, system design diagrams and supporting documentation.

The product's Entity list enables analysts to create, save and compare lists of items stored in the dictionary. Lists can be created using selection criteria such as dictionary audit attributes.

XL/Design Integrator can produce graphics analysis reports. For example, its Level-to-Level Balancing report verifies data flow by comparing a graph and its lower levels, and its Explosion creates a hierarchical table of contents up to nine levels deep.

A Verification report lists every illegal connection and any unconnected object in a data flow diagram. Other reports illustrate which files use the same access key, which records are used in a given data flow diagram and which users are responsible for which entities.

The product is able to import and export Excelerator files so that designs can be shared by members of the application team.

XL/Design Integrator operates on any VAX system that runs DEC's VMS 4.1 operating system. The full Excelerator system runs on the IBM Personal Computer line.

License fees for XL/Design Integrator range from $10,000 to $35,000.

DNS releases editing package

From page 25

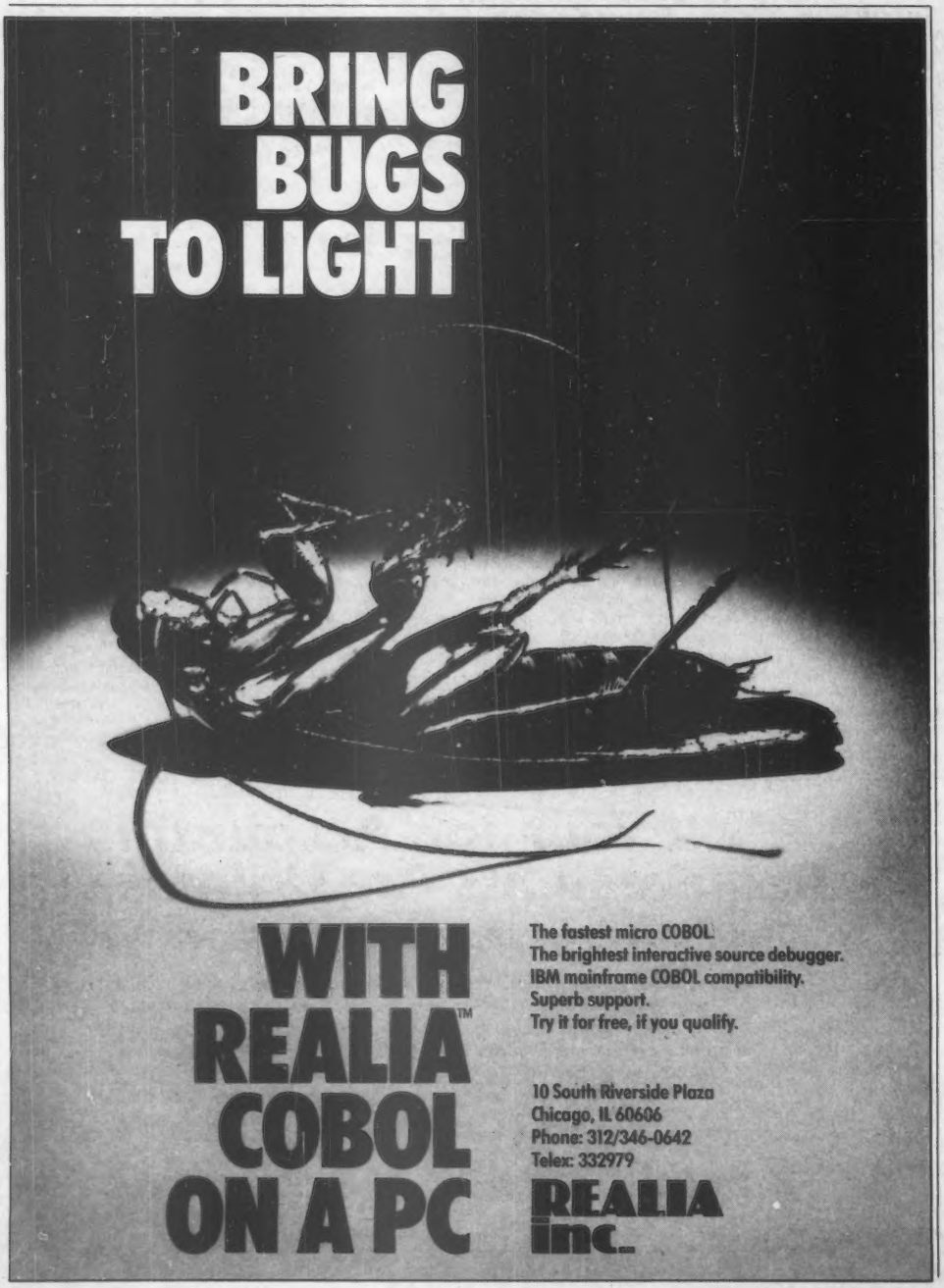
copying blocks of code. The product includes an audit trail for all global partitioned data set and procedure library changes.

System programming tools include access to data sets and a console display. The package displays on-line free DASD space.

DNS Editor supplies security features such as control over access to data sets, volume or job.

DNS Editor runs under IBM's DOS, OS/VSI and MVS operating systems and can be used with IBM 3270 series terminals Models 2, 3 and 4.

The software costs $15,000.



TI looks ahead with Focus

From page 25

ing and for department-level systems," Fischer said.

TI's central DP is based on IBM 3030 and 3080 mainframes. Departmental processing is handled by nearly 50 IBM 4341 mainframes. The company also has 17,000 TI Professional Computers, 15,000 of which are connected to its worldwide IBM Systems Network Architecture net.

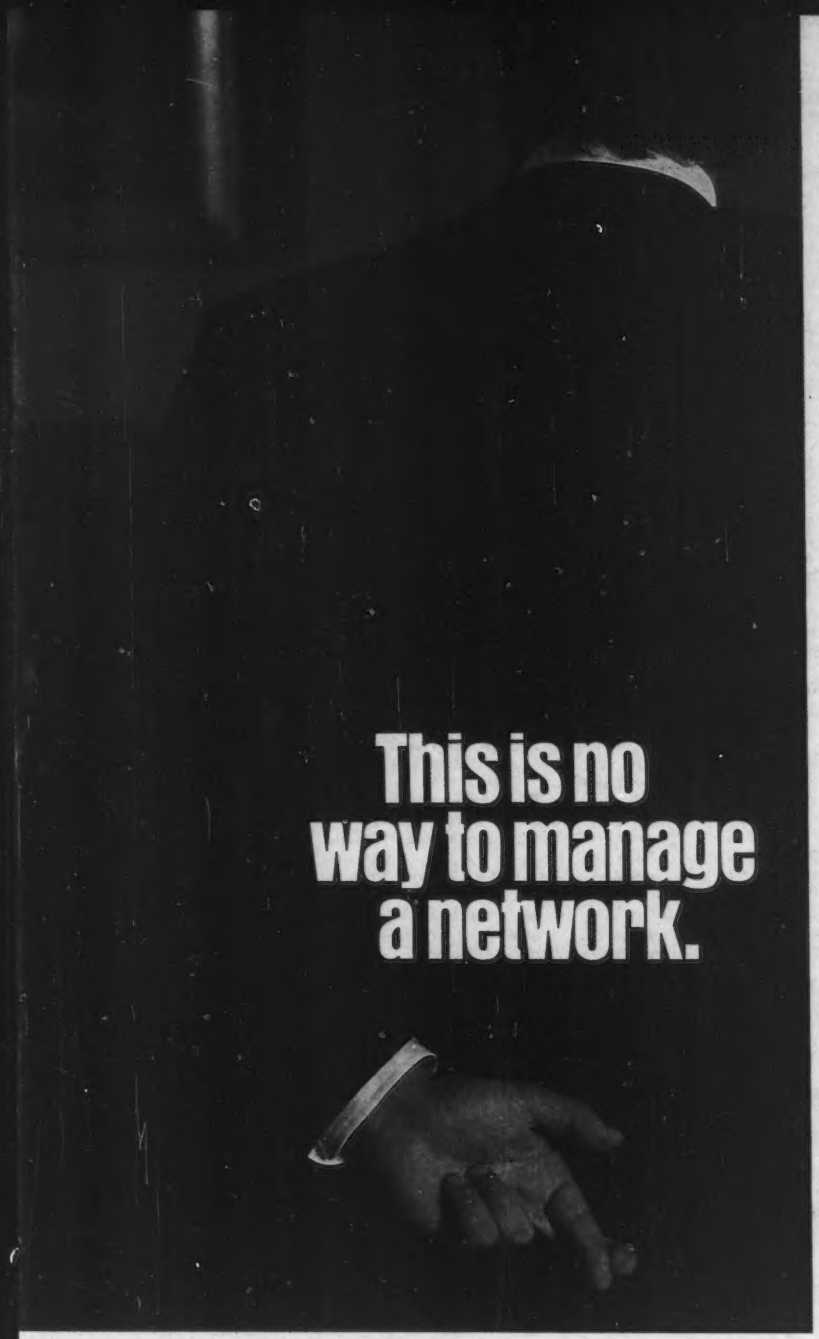
Focus users access both live data and copies of data, but are not allowed to update production data. "None of the horrible things that people thought were going to happen if we let users in our data bases have happened. Users are not bent on destroying the corporate files. We've found that they behave very responsibly," Fischer said.

The performance of Focus reporting applications is comparable to that of similar programs written in Cobol. "You can extract a single page of data with an IMS Cobol-written transaction faster than you can with any kind of Focus TSO transaction, but a Cobol report typically gets put out to a printer. With Focus, it's convenient to put out the report on-line or in batch mode," Fischer said.

Before a major application is put into production at TI, it is often prototyped in Focus and tested. "All or part of the prototype is usually converted to Cobol," Fischer said. Decisions are based on whether the application's complexity and processing demands are appropriate for Focus.

TI's implementation of Focus does not allow concurrent updating of the data base, although Information Builders does offer that capability through an optional product. "We found it to be unsatisfactory in our environment," Fischer said of the option. "You've got to have MVS console operators starting and stopping tasks, and turning stuff off and on and jacking around with the software. That is not our operating environment. Things have to run on automatic pilot here," Fischer said.

Because TI is such a heavy user of Focus, the firm occasionally uncovers bugs in the product. When such a glitch is found, TI reports it to Information Builders, which usually fixes it in a future release of the product, Fischer said.



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Machine tool link near

Aids shop in CAD, code generation

By Bryan Wilkins

GAITHERSBURG, Md. — The National Bureau of Standards (NBS) has completed a prototype software program that links incompatible hardware and software systems to perform computer-aided design (CAD) and automatic real-time code generation for the machine tool industry.

The prototype, developed at NBS' Automated Manufacturing Research Facility (AMRF), is aimed at production shops where numerically controlled metal-cutting machines produce small parts used in other machines. These shops have traditionally relied on manual labor and have been the among the slowest sectors to introduce automation into the workplace, NBS said.

According to Charles R. McLean, the software system architect for the prototype, no interface standards for computer-driven numerically controlled machines currently exist. "The industry has chosen to develop proprietary interfaces, and users have been disavantaged," he said.

McLean, however, reported that major U.S. manufacturers of computer-controlled machine tools are becoming interested in supporting essential standard interfaces.

In a display of the AMRF prototype, McLean drew on a CAD workstation a design of a metal part to be milled by a machine. The design was then automatically translated into code that could run on a numerical control machine on the shop floor, which then instructed a milling machine to select various drills and to cut a brass block into a shape reflecting the CAD design.

The time taken to complete the job was approximately 20 to 25 minutes, which compares with traditional manually operated machine times of a day or longer.

Ernest Ambler, director of NBS, said it is "critical that U.S. industry now invest in the technology" that NBS has been developing.

The AMRF said its research is aimed at shops where production runs are for orders of 50 parts on average.

Notes: Ada in the news

From page 25

ening Computer Associates' position as a supplier of MVS data center tools.

■

A Personal Computer first. Alsys, Inc. is boasting the first ever prevalidation of an Ada cross-compiler for the IBM Personal Computer AT. Prevalidation is the final step before formal validation of an Ada compiler by the U.S. Department of Defense. The cross-compiler compiles Ada code on a Digital Equipment Corp. VAX, with the code running on the IBM Personal Computer AT. Described as the forerunner of native AT compilers, the cross-compiler is scheduled for shipment in the first quarter of 1986.

■

Other Ada news. Systems Designers Software, Inc. has entered into a cooperative engineering and marketing agreement with Tektronix, Inc.'s Software Development Products Division. As a result, System Designers Ada-Plus 1750A cross-compiler can be paired with the Tektronix 1750A Software Integration System. The combination will allow users to write and download Ada code to any hardware implementation of the Mil-Std 1750A system.

■

VAR you go. Cincom Systems, Inc. has set up a valued-added reseller program for its Mantis fourth-generation language. A spokesman said the program will allow developers to bring applications to market more quickly using Mantis. Mantis programs are said to be portable between IBM mainframes, Digital Equipment Corp. VAXs and Wang Laboratories, Inc. VS systems.

■

Hand-in-hand. Digital Equipment Corp. and Software International Corp. penned a cooperative marketing agreement to provide applications tailored for DEC's VAX systems and its All-In-One office system. The deal centers on Software International's Peak Performance line of financial and human resources software.

■

The American way. Software AG and American Management Systems, Inc. (AMS) concluded a joint marketing and OEM agreement through which AMS will market versions of its applications for Software AG's Adabas data base management system and will provide DBMS components for those applications. The agreement covers AMS' government, educational and oil and gas finance systems.

■

TI for AI. Texas Instruments, Inc.'s Data Systems Group is now in the knowledge engineering consulting services business. The Data Systems Group's consulting is aimed at helping organizations develop expert systems. The group has already completed knowledge engineering programs for government and defense agencies, as well as for private firms. The Austin, Texas-based group says it will charge roughly $650 per man-day plus expenses for its services.

■

Short and sweet. Digital Equipment Corp. penned a cooperative marketing agreement with West Lafayette, Ind.-based Pritsker & Associates, Inc. that will allow DEC to market three Pritsker manufacturing simulation packages for its VAX processors. The packages include Slam II, a simulation language; MAP/1, a simulator for the design and operation of manufacturing systems; and Tess, an integrated simulation system with graphics and animation capabilities.



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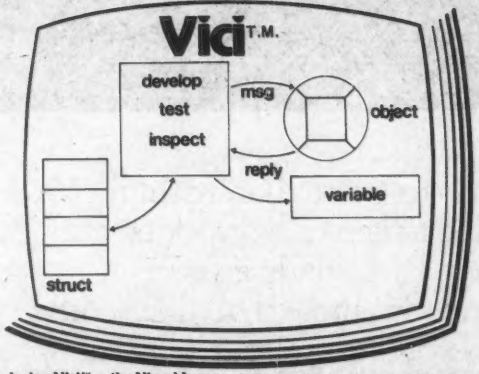
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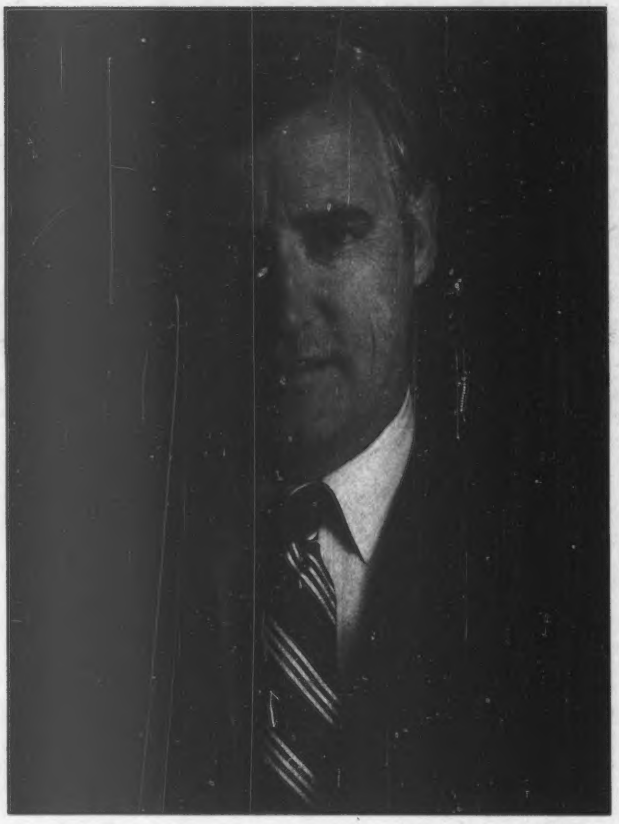
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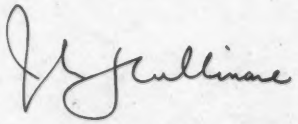
The first back-end database machine prototype and distributed database system; the first, and only, teleprocessing monitor built for IBM computers in the last ten years; the first online Applications Development System (ADS/OnLine) for complex, high-volume applications; the first, and only, 4th-Generation Applications Software; the first transparent integration of personal computers with mainframe systems; the first implementation and full integration of database, applications, and information center/PC software, and much more.

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As proud as we are of all these accomplishments, however, we are proudest of the special relationship that exists between ourselves and our customers. Cullinet has brought to the software industry a characteristic common to all successful companies: we are "user-driven." We understand clearly that we are in business to serve the needs of our customers. And this understanding shapes everything we do.

It is this emphasis on customer requirements and satisfaction that has resulted—year after year, in survey after survey—in Cullinet's top ranking in the categories of vendor support, documentation, training, and overall user satisfaction.

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John J. Cullinane
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1. Number One in Industry Sales

INDEPENDENT SOFTWARE VENDORS Software News' Top 50 Independent Software Vendors	
CULLINET SOFTWARE, Westwood, MA	$144,000
LOTUS DEVELOPMENT CORP., Cambridge, MA	140,000
MICROSOFT, Bellevue, WA	123,000
MANAGEMENT SCIENCE AMERICA (MSA), Atlanta, GA	120,000
APPLIED DATA RESEARCH INC. (ADR), Princeton, NJ	90,000
COMPUTER ASSOCIATES INTERNATIONAL (CAI), Jericho, NY	81,000
INFORMATION GENERAL, Woodland Hills, CA	74,000
DUN & BRADSTREET (D&B), Wilton, CT	70,000
UCCEL CORP., Dallas, TX	68,000
1984 U.S. Revenues ($000)	

While Cullinet never expected or sought to become the largest software company in the world, it still is a significant accomplishment.

Source: Software News

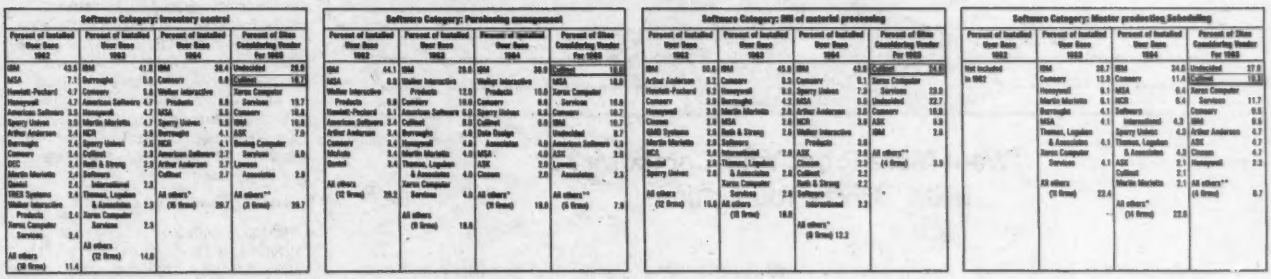
2. Number One in DBMS Sales

Intentions to Buy DBMS	1983	1984	1985 (YTD)
CULLINET	173	206	148
IBM (IMS)	147	180	79
ADR	76	130	64
IBM (DB2)	2	47	50
IBM (DL/I)	158	140	49
IBM (SQL)	81	110	48
SAG	91	100	46
CINCOM	38	72	17
CCA	17	21	11

Buying preference for IDMS/R is increasing because as more buyers become more knowledgeable in database technology, they recognize the technical advantages of IDMS/R over competing products.

Source: Computer Intelligence Corporation

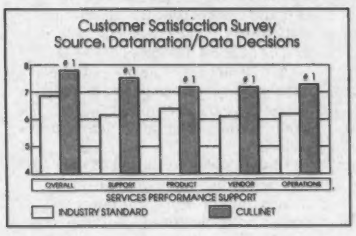
3. Number One in Manufacturing Applications



Source: Software News

Buyer surveys show convincing proof that Cullinet's 4th Generation manufacturing applications are the way of the future.

4. Number One in User Satisfaction



When it comes to vendor support, Cullinet is rated Number One year after year in every category.

Source: Datamation/ Data Decisions

5. Number One in Management

THE WALL STREET
TRANSCRIPT
"The Information Center for the Business and Financial Community"

TWST Names Cullinane & Goldman

Best Chief Executives

Computer Software Industry

Source: The Wall Street Transcript

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IBM's LU6.2 coming of age

From page 25

direct connections where desired. This attitude has much of the flavor of distributed data processing (DDP), a concept that became popular in the late 1970s. But the technology had not yet arrived to support the concept of DDP. In a sense, LU6.2 is distributed processing come of age.

But even with millions of micros being put to use each day and a powerful and mature SNA in place, peer-to-peer communications is still several years away.

Is this too pessimistic? After all, IBM has powerful business motivation for getting LU6.2 widely implemented as quickly as possible. Successful implementations of LU6.2 will chew up hardware (and software) at least as fast as the rate at which micros were sold in the early 1980s. IBM's tepid financial performance in 1985 means that it has to find ways of moving iron faster.

LU6.2 acceptance would be delayed

However, IBM needs successful implementations. Unsuccessful LU6.2 experiences would not only slow down LU6.2 use, but they would probably add years of delay to acceptance of the concept, and a key IBM strategy would have its credibility placed in question.

IBM's caution is understandable in view of both the business and technical risks involved. The technical changes required on IBM's part are important. Changing the architectural assumptions within SNA is analogous to, say, renovating a hotel from its steel framework outward. It is not impossible, but it is extremely challenging if another objective is to maintain current levels of hotel occupancy.

Changing host systems software to operate as a peer is tricky. VTAM and Network Control Program (NCP) assume that they are in charge — terminals can ask but cannot demand. Changing VTAM and NCP are significant activities that will require significant amounts of time.

These changes, daunting as they are, represent just a sample of the modifications that are necessary at the operating system level. Perhaps even more intellectually challenging are the changes required in data management.

Data is often changed as a result of peer-to-peer communications. However, such data changes will often affect other points in the network in addition to those directly involved. How will the data elements involved be identified? How will other points in the network be informed of the changes that have taken place? How can these data-related events be synchronized so that logical actions are based on the most recent data?

These kinds of activities are now managed by host-based data base management systems. Will there still be host-based DBMS in an LU6.2 environment? If so, they will certainly not look like the mainframe DBMS of the past 15 years.

These are just some of the technology issues. The larger issue is how long it will take systems designers to adapt to the new peer-to-peer environment. There will be at least two major areas of adaptation required: physical data structures and locations and segmentation of data and related processing.

It is ironic that for the past dozen years so much stress has been put on developing logical data relationships. Data base designers have been taught rigorously to ignore the physical structure of a data base since this would lock them into a limited set of solutions. However, in a distributed environment, one cannot get away from the fact that data will, at the least, be physically separated and duplicated.

Physical design will be a curse

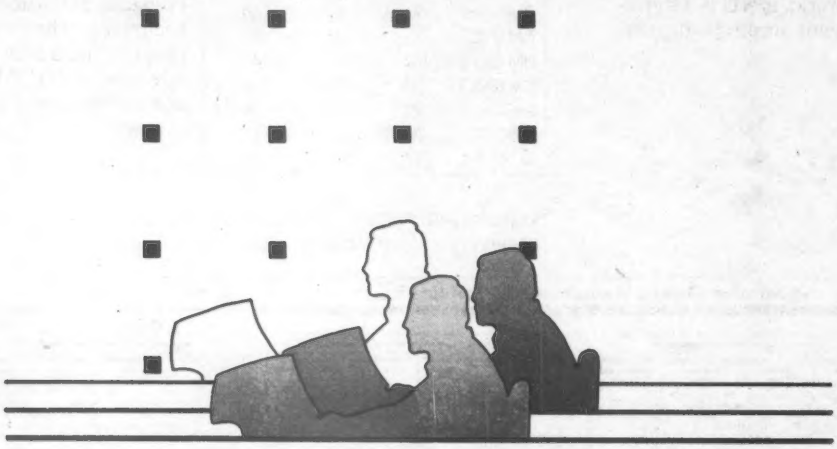
Physical location will have to be taken into account. However, physically oriented design in the new peer-to-peer environment will cause all of the problems that physical design of single data bases caused in the 1970s. While physical design will be a curse, it is one that will not be easily avoided.

The issue of data segmentation is an even more difficult issue since it is mainly conceptual. How should data be divided between data owners, or at least data keepers — a vital distinction? The question of data ownership has been struggled with for years in many organizations, usually without a clear-cut decision.

Physically distributed data bases will bring matters to a head, both from a data design standpoint and from a political standpoint. Data designers generally make poor politicians and vice versa.

What will happen to current applications? They will be no better adapted to the world of LU6.2 than systems software. A new generation of applications will emerge but at great cost, since initially, few people will know how to build them. There will be at least as many delays as on the systems software side.

The road to LU6.2 will more than likely be a bumpy one. IBM will be taking a relatively long time to solve its problems. That may give the rest of the interested parties — vendors, MIS planners and end users — sufficient time to plan for this new environment.



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MICROCOMPUTERS

SMALL TALK
Eric Bender
CW Senior Editor

All quiet on the micro front

Once again it is December, time to close the books on another year of microcomputing.

In some ways, nothing has changed. Everyone is still wondering if we'll see multitasking and extended-memory MS-DOS from Microsoft Corp. next year or the year after. Retail prices on personal computers are wobbling downward, and Apple Computer, Inc. keeps dropping those semiofficial hints about what's coming for the Macintosh in January.

There doesn't seem to be any great mystery about the next Mac attack: an upgrade with a megabyte of internal memory, a Small Computer Systems Interface port, a revised read-only memory BIOS supporting hierarchical files and a higher density floppy disk drive, along with an enhanced Laserwriter printer. But there doesn't seem to be great excitement about the debuts either, even among the Mac faithful.

Plummeting price tags show the bitterness of the battle on the street: Customer costs for a Mac have been slashed roughly $1,000 during the past year, while IBM Personal Computers and the like have slipped only about $300.

A year ago, Lotus Development Corp. had just taken the wraps off its Jazz integrated package, and there was much talk that the package would dance the Mac into corporate America's heart. It didn't quite work out that way, perhaps because Jazz didn't ship until last spring — almost a year and a half after the Mac rollout.

Microsoft's Excel, unleashed on the world two months ago, drew similar attention. Like Jazz, it quickly made the Softsel Computer Products, Inc. Hot List but has not reached superstardom.

Whether or not these packages ever really make the big time, they both show the ground still being gained in software design, and they make Lotus' 1-2-3 look long in the tooth. (Last week Lotus gave one sign it may agree with

See **ALL** page 36

Info centers wear many hats

End-user support runs gamut of services

By Eddy Goldberg

BOSTON — In day-to-day practice, running an information center can take the patience of a first-grade teacher, the computer expertise of a DP manager, the business acumen of a banker and the political cunning of a Machiavelli.

This is a rough consensus of viewpoints from information center directors at John Hancock Mutual Life Insurance Co., Honeywell, Inc., Bank of New England NA and their peers, who gathered to discuss the topic "Information Center Experiences: What's Worked, What Hasn't" at a monthly meeting of the Society for Management of Professional Computing (SMPC).

In the most general sense, information centers aim to serve and support end users. More specifically, the functions performed by information center employees encompass training and education, setting hardware and software standards, maintaining a library of computer-related information, developing user applications, forming users groups, servicing and maintaining equipment and justifying their department's existence to management.

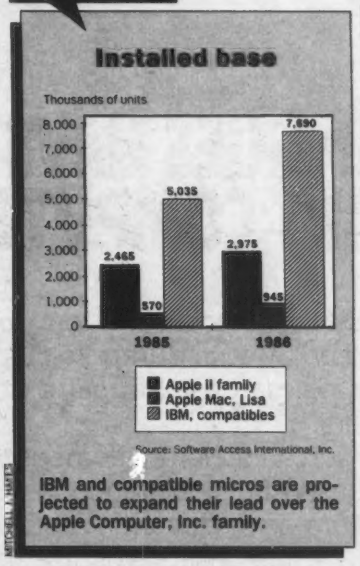
Jim Howard, a consultant in John Hancock's information center in Boston, called his group an "end-user computing service" and, like many others at the meeting, questioned "information center" as a description of what the group does.

His staff of 12 serves 1,500 end users, primarily in desktop applications off IBM mainframes, and provides high-level consulting on data processing to the user community. Howard says his shop is set up like a classic IBM information center, but it does not support personal computers. Those are handled by the office automation group at John Hancock, so the two groups sometimes find themselves in competition.

Danielle Barr, vice-president of corporate systems at the Bank of New England, said the Microcomputer Center was formed 3½ years ago as part of the firm's Information Resource Center "to control PC proliferation." There were about a dozen personal computers then; today they number about 330. She feels her primary

See **INFO** page 36

DATA VIEW



IBM and compatible micros are projected to expand their lead over the Apple Computer, Inc. family.

MITCHELL HAYES

Prototype unit handles speech

By Rosemary Hamilton

NEWTON, Mass. — Dragon Systems, Inc. unveiled an experimental prototype of a speech recognition system said to represent a major technical improvement because it runs on low-cost hardware and offers advanced natural language capabilities.

Dragon's prototype is software designed to run on the IBM Personal Computer AT. Eventually, the product will be sold as an attachment for the computer, said Janet Baker, president of Dragon.

Although Baker would not describe the exact makeup of the future product, she predicted it will be commercially available in approximately 18 months, selling for about $3,000.

Dragon, which now is working with one vendor that may market the product, intends to continue as a research firm and has no plans to market the system itself, she said.

See **PROTOTYPE** page 35

INSIDE

Office Solutions upgrades the Officewriter word processing package/**35**

Data Physician, a package designed to find and remove software "viruses," debuts from Digital Dispatch/**35**

NEW THIS WEEK

- Omnicomp Graphics introduces the Totalcad system
- Datapoint announces the Starport multiuser data processing system

For more on these and other new products, see pp. 63-79.

INSTANT ANALYSIS

"The industry has been very slow to recognize how quickly people become power users."

— **Richard Rabins, president of Alpha Software**

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Now that the world relies on computers it needs a computer it can rely on.

Software cures micro "virus"

Digital Dispatch tool locates destructive code

By Donna Raimondi

MINNEAPOLIS — The beginning of flu season seems like an appropriate time for Digital Dispatch, Inc. to announce a "virus detection and removal" package for the IBM Personal Computer and compatible systems.

The Data Physician software is said to locate and help remove "worms" — bits of self-replicating code written with mischievous intent and capable of infecting and destroying everything on a disk or even on a network.

The $49.95 package also allows users to develop their own viruses for test purposes, said Eric Hansen, vice-president of software development. Data Physician includes a training tool kit that allows data security personnel to develop and test disaster recovery procedures against an actual harmless computer virus that they create, Hansen said.

Viruses can be downloaded from a public domain bulletin board onto a users program, he said. That virus can then be transmitted to any other disk a user puts on his system until a certain date or condition is reached when all the viruses go to work to erase all the files on the disk. A virus acts on one computer, and viruses that spread via networks to a number of computers are called worms.

'Destructive potential is enormous'

"The destructive potential of just one person writing a single virus is enormous," Hansen said, "given the dependence that modern business, financial networks and society itself has on computer systems."

Data Physician may be a product before its time, Hansen admitted, although he has heard of one case in which a West Coast company lost a considerable amount of data from its IBM mainframe. He developed the current package because the West Coast company's midwestern division wanted to prevent the accident from recurring.

Data Physician is not copy protected. The package requires IBM's PC-DOS 2 or above and 128K bytes of random-access memory.



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Office Solutions enhances Officewriter for IBM micros

By Eric Bender

MADISON, Wis. — Office Solutions, Inc. has enhanced its Officewriter word processing package for IBM Personal Computers with a keyboard macro facility, mathematical functions and additional editing features. The company also has introduced a network version and an add-on package for merging text with graphics and has disclosed some details on volume purchase policies.

Officewriter 4's macro facility will permit users to store a series of keystrokes and replay them with a single keystroke or reassign function keys. The mathematical functions allow the creation of rows and columns of numbers, which can be totaled horizontally or vertically, the company said. Among new editing features are delete within insert and destructive backspace capabilities.

Office Solutions is also bundled in its 80,000-word Officespeller spelling checker with Officewriter 4, which will be available next month for $445.

Also shipping in January, the Officewriter Network Version will support the IBM PC Network, as well as 3Com Corp. and Novell, Inc. networks. The package also will be fully compatible with the IBM Token-Ring network, according to Office Solutions President Jan Eddy.

The Network Version supports document locking and lets each user access up to four local or remote network printers. The software also permits users to access documents in different directories and to create their own default settings and custom dictionaries. A three-user network pack costs $995, with additional workstations priced at $245 each.

Officegraphics, a $145 package available in January, was designed to let users import graphics created with packages such as Lotus Development Corp.'s 1-2-3 or Graphic Communications, Inc.'s Graphwriter. Once captured, the images can be clipped, rotated, expanded or reduced.

Users can toggle back and forth

Because Officewriter is shown in the Personal Computer's text mode, merged text and graphics cannot be displayed simultaneously on the screen, but users can easily toggle back and forth between modes to see what they can print, according to Jim Crist, marketing vice-president.

Additionally, Office Solutions introduced two specialized dictionaries, Officespeller/Legal and Officespeller/Medical, each available for $95.

Finally, the company outlined a volume-purchasing program for customers that buy more than 50 units over the course of a year and site license agreements, which begin with a minimum of 200 copies and permit copying up to a specified number of units. All arrangements include a role for a designated local dealer, Office Solutions emphasized.

Prototype unit handles speech

From page 33

Currently available are a number of speech recognition systems, which range in price from a low of a few hundred dollars to a high of $8,000, Baker noted. They are sold by a number of vendors — with IBM, Texas Instruments, Inc. and Kurzweil Applied Intelligence Corp. the front-runners — and they vary widely in capabilities, with vocabularies ranging from 50 words to upward of 1,000 words, she said. According to Baker, Dragon's prototype, which recognizes 2,000 words, is the only AT-based system that uses natural language techniques.

No artificial command control needed

While the term natural language has many interpretations, Baker suggested that it means that "you can dictate anything you want without artificial command control, and it will come up in printed form."

She claimed that the only comparable system is a prototype demonstrated last year by IBM's Thomas J. Watson Research Center in Yorktown Heights, N.Y., "It could recognize 5,000 words in near real time, but that was on $1.5 million worth of computer equipment. We have showed the technical feasibility of doing it on a desktop computer."

Baker said Dragon's system could recognize more than 2,000 words if it ran with a more powerful processor, such as the Intel Corp. 80386 microprocessor, instead of the 80286 on which it currently operates. However, the company has not publicly demonstrated this capability.

Like most commercially available systems, the Dragon prototype must be trained to recognize a user's vocabulary. Dragon has designed software with which the user can "teach" the AT the words he most often uses. Once this information is stored in memory, the computer can then match spoken words with those it has learned. The system can understand up to 30 words per minute.

In October, the company announced it had licensed other speech recognition proprietary software to IBM, which has incorporated it into three recently announced products. These were the IBM Personal Computer Voice Communication Option, the IBM Voice-Activated Keyboard Utility program and the IBM Personal Computer Voice Communications Application Program.

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Info center approaches

From page 33

responsibility is "to get the right tools to the people who need them."

Another problem Barr faced was maintenance. When confronted with the high cost of a service contract to repair and maintain her firm's computer equipment, she discovered it would be more inexpensive to hire a full-time employee.

She found a typewriter repairman within the company who was interested in the position. He was trained by her equipment vendors for what she considers a very low cost. The result was not only a 60% cost saving but also faster response time, better preventive maintenance and more uptime.

Honeywell center

Kathy Kilduff manages Honeywell's Information Technology Center in Waltham, Mass., and supports 1,300 employees. The center, which is part of the company's Corporate Information Management Group, began operations in June 1984, Kilduff said.

She said the center has saved Honeywell at least $60,000 in its first year of operation, plus the value-added, intangible benefits of more confident, productive and creative workers. Kilduff described her approach as 5% talk and 95% hands-on and said she feels the secret to success is first to break down the fear factor and then build up trust. "My biggest job is to listen," she said.

At Norton Co., which manufactures abrasives products, Janice Smith, supervisor of the information center, faces the problems entailed in moving smokestack industry workers into the electronic age. The company is introducing a shop floor control project in two divisions.

Smith said there are two critical questions to remember when asking men who have worked on industrial machines for 20 or 30 years to learn to use a keyboard to make real-time, on-line decisions: Can they adjust to the technology? And, if so, are they willing to make the transition?

In her experience, many people who have implemented computer systems wish in hindsight that they had spent more time educating the users. "Shouldn't you spend at least as much time in educating and training the people who will work on the system as you do in planning that system?" Smith asked.

However, training users on Lotus Development Corp.'s 1-2-3 in an accounting firm and training factory floor workers to use Micropro International Corp.'s Wordstar demand very different approaches.

And while one SMPC member said it was virtually impossible to mandate hardware or software standards in his company, another shuddered at the mere possibility of allowing end users to choose their own equipment. In short, members said, there are no easy formulas for running an information center — just a number of creative solutions to difficult problems.

All quiet on micro front

From page 33

that last assessment, as it announced plans to buy GNP Development Corp., whose Human Access Language front-end software for 1-2-3 has impressed many early viewers.)

Among other software applications, none of the promising, not-quite-vertical categories like graphics and project management has yet emerged as a big winner.

On the hardware side

A year ago on the hardware side, the shift toward Intel Corp. 80286-based systems was just getting under way. While early IBM Personal Computer AT customers were still trying to isolate the problems with the hard disk drive and experimenting to find what software ran on the new machine, IBM announced that it was unable to meet demand for the hard-disk model and would reschedule customer deliveries.

Those ramp-up problems have faded into history, and overall sales of AT-class systems haven't met expectations.

Of course, overall sales of all classes of personal computers haven't been great. Everyone but Compaq Computer Corp. seems to be hitting a brick wall, and Compaq is getting close enough to count the bricks.

Despite the slowdown, however, industry speculation continues as feverishly as ever, regularly climbing the heights of absurdity. If newspapers covered politics the way the trade press covers systems software, we would be constantly reading about events in the second term of President George Bush.

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COMMUNICATIONS

WIRE TAP
Daniel Minoli

What's No. 1, voice or data?

It has been the intent of this column in the last year to address how to design the best possible data communications network in the most cost-effective way. Pragmatic issues were presented to stimulate the practitioner's mind and enrich his repertoire of intellectual tools to attack the challenging opportunities of communications.

We summarize here the year's material to crystallize the underlying theme.

Early in the year, the need and methodologies for a global backup of the communications network were presented. An entire company's viability and serviceability may well depend on communications. This is not always recognized. Witness the fact that in many organizations communications is still subordinated to computer systems. In this environment, communications receives less attention than DP, or it gets attention filtered through the eyes of DP. MIS directors typically report fairly high up in an organization, while communications people may not.

In many cases, the total cost of communications already exceeds the MIS budget; it makes sense in these cases not to subordinate communications to computer systems. The cost of communications will continue to rise. A few years ago, a typical installation might have involved a multimillion-dollar CPU and a few thousand dollars of com-

See **WHAT'S** page 42

Minoli is a member of the Bell Communications Research (Bellcore) network architecture planning group. Opinions in this column are strictly the author's and do not represent the view of Bellcore.

Boeing spends $100 million to revamp private network

By Peggy Watt

SEATTLE — Boeing Co. announced earlier this month that it will buy five 5ESS digital switches and an undetermined number of System 85 private branch exchanges from AT&T Information Systems as part of a multimillion-dollar modernization of its communications system, which will eventually bypass much of the public network.

The contract is worth an estimated $100 million, including the cost of facility construction and work by other suppliers at smaller Boeing facilities, and it is due to be completed by early 1988. Primary sites for the new equipment will be Boeing offices in Seattle; Wichita, Kan.; Vienna, Va.; and Philadelphia, according to a company spokeswoman.

The company estimates it can save $150 million in the next 10 years by shouldering more of its communications needs — as allowed under a divested national telephone system — according to the company's telecommunications services modernization task force formed in 1983. Maintenance will be under contract with suppliers, and the project is overseen by Boeing Computer Services Co. in Bellevue, Wash.

Boeing will remain a big customer of local operating companies — including Pacific Northwest Bell Telephone Co. in the Seattle area — for local service outside company facilities, said Eryk Asman, program manager of Boeing's telephone service modernization program.

He said some new equipment will replace operating companies' Centrex systems at field and branch offices, which will be served by smaller switches under contracts with Intecom Co., GTE Corp., South Central Telephone Co., Pacific Northwest Bell and Southwestern Bell Telephone Co. More than 90 field offices will be affected by the contract.

See **BOEING** page 38

Micom introduces Instanet 6000

Firm looks to medium-size switch to crack new market

By Paul Korzeniowski

SIMI VALLEY, Calif. — Micom Systems, Inc., one of the leading suppliers of low-end data switches, is attempting to enter new markets with its Instanet 6000 series of data switches.

The latest addition to that series, Instanet 6600, was designed for large communications networks and supports more than 2,016 channels. The switch uses standard telephone wiring and connectors and is able to support data transmission speeds up to 19.2K bit/sec. It can be used as a hub in a data network that enables users to contend for computer ports or other resouces or as a fallback switch to connect users to alternate hosts when primary facilities are unavailable.

Micom claimed that its range of interface options is among the broadest in the industry. The company supports four classes of plug-in interface modules, including local RS-232 interfaces that support four separate channels; a 50-conductor telephone company connector; local multiplexers that can support as many as 128 devices over two twisted-pair wires; gateways to IBM Synchronous Data Link Control or Binary Synchronous Communications network environments as well as X.25 packet-switched nets; and integral data concentrators that statistically multiplex remote clusters of terminals or sets of computer ports over a single phone line.

Users can access resources by asking for them by name. Connection dialogue can be tailored by the system manager.

System administrators can configure

See **MICOM** page 42

INSIDE

Hayes Microcomputer Products plans to publish a synchronous communications application interface/**42**

NEW THIS WEEK

- Case Communications introduces its Grapevine local net
- DEC announces an Ethernet local-area network management tool

For more on these and other new products, see pp. 63-79.

INSTANT ANALYSIS

"Today, General Motors works with less than 1,000 vision applications. In 10 years, we will have approximately 44,000."

— Robert J. Eaton, vice-president at General Motors

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Oracle announces portable version of IBM SQL/DS and DB2

Any application written for IBM's SQL/DS or DB2 relational database management systems will now run without modification on DEC, DG, AT&T, HP and several other manufacturers' minis, and a wide range of micros, including the IBM PC/XT and PC/AT.

Oracle Corporation introduced the first relational DBMS in 1979. Today ORACLE is the only relational database management system that is completely compatible with IBM's SQL/DS and DB2. Programs written for SQL/DS or DB2 will run unmodified on ORACLE.

Originally designed for IBM mainframes and DEC superminis, ORACLE is now available on a wide range of machines, from mainframes to PCs. And ORACLE includes an integrated set of 4th generation software tools not available with either SQL/DS or DB2.

■ **Why not Cullinet, ADR or Focus?** There is a clearly defined standard for relational database systems. It's called SQL, and it's from IBM. Both ANSI and the US Government are in the process of adopting SQL as *the* standard database language. The Cullinet, ADR and FOCUS software packages each implement their own unique database language - each one painting the user into its own corner. Since its inception, Oracle Corporation has provided total IBM SQL compatibility.

Few shops nowadays run only IBM mainframes. Why, then, even consider a database solution that runs *only on IBM mainframes?* Applications written with ORACLE run identically on mainframes, minis, and PCs. Because all versions of ORACLE *are* identical.

FOCUS, Cullinet and ADR offer either a limited subset, a completely different product or nothing at all (respectively) for the PC. And none have minicomputer products.

■ **Why not just go with DB2 or SQL/DS?** A relational DBMS simplifies but does not by itself eliminate application programming. Additional tools are necessary if users are to create and maintain their own applications.

DB2 and SQL/DS are relational systems, period. ORACLE is a relational DBMS plus integrated 4th generation software tools for application generation, report writing, color graphics and network communications.

Furthermore, SQL/DS and DB2 run only on IBM mainframes (and are somewhat unlikely ever to run on another vendor's system). ORACLE runs on more IBM hardware and operating systems than do IBM's relational products.

■ **What about Goldengate, dBase III, Symphony or Framework?** PCs need more than PC software if they are to be usefully integrated with corporate data processing. Incompatibility with SQL, while serious, is not the only major problem with these micro packages. None provides an acceptable level of data security, integrity or recovery facilities. And their PC-to-mainframe links are functionally primitive and difficult to use.

To effectively link computers, all machines in the network should run the same software. Only ORACLE provides standard software on mainframes, minis and micros. Data and programs can then be shared among users of different machines, distributing the workload.

ORACLE is currently installed on over 1000 mainframe and supermini systems around the world, as well as on thousands of PCs. Oracle's customers include 8 out of the 10 largest U.S. corporations, as well as major foreign companies and government agencies.

For further information, contact Oracle Corp., Dept. C2, 2710 Sand Hill Rd., Menlo Park, CA 94025, or call 800-345-DBMS.

Waterway telephone due to ship

JEFFERSONVILLE, Ind. — The realm of telecommunications recently expanded beyond cars and airplanes, many of which are now equipped with telephones, to boats.

Waterway Communications System, Inc. has demonstrated and begun construction of a telecommunications system that, when completed, will provide service to 4,000 miles of inland waterways, including the Mississippi, Ohio and Illinois rivers, as well as the Gulf Intracoastal Waterway, parts of tributaries and some of the Gulf of Mexico.

Compared with the use of standard VHF sideband radio, the Watercom radio system uses radio frequencies dedicated to marine communications systems, which improves sound quality and eliminates call delays, the company claimed.

Vessel telephones are priced at $7,000 each, the vendor said.

The telephones communicate with one of 54 shore stations spaced along the banks of the waterways served, enabling users to place or receive calls, Waterway Communications said.

Users pay a monthly subscription fee, and they are charged per minute of connect time.

Rates are competitive with conventional marine communications fees, according to the vendor.

— John Dix

Boeing to revamp net

From page 37

Some 65,000 telephones throughout the company will also be replaced with more than 70,000 single-line, electronic instruments. The purchase is also part of a long-term effort by Boeing to move toward an integrated services digital network.

While economics is a major reason for the change, the uncertainty of local telephone companies' capabilities in the future in a competitive communications market is another concern, Asman said.

"We have always been alert to opportunities of taking on new technology," Asman said. In the 1960s, Boeing installed a microwave transmission system in its Seattle-area offices for data communications access to remote computers when the local telephone company could not provide the service thoroughly and quickly enough for Boeing's needs.

"The microwave has been upgraded substantially since then" and is used for local videoconferencing as well, he added. "Divestiture prompted us to look at our entire telephone service."

Provide specialized services

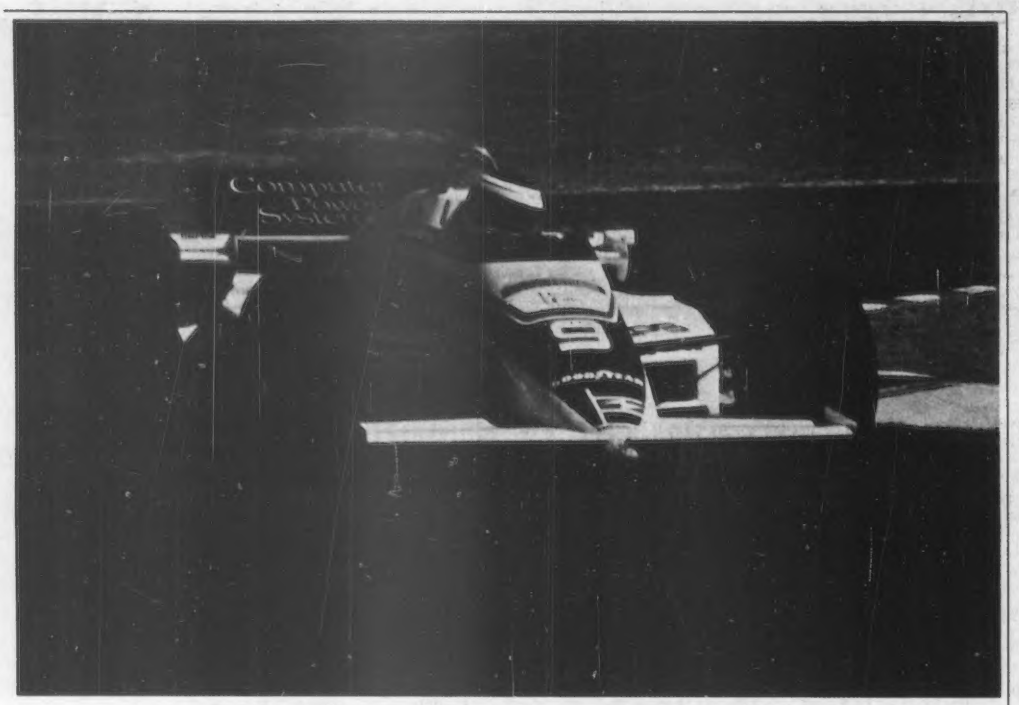
Building its own network lets Boeing provide dedicated data lines and other specialized services that not all local telephone companies can offer in quantity, said Marty Hill, telecommunications services manager.

"Under today's scenario, the operating companies have difficulty offering enhanced services on machines in the public switched network," he said.

The company is also eyeing its long-distance service options. Hill said Boeing has already relied on least-cost routing through several services since the 1960s.

"We've traditionally been a multivendor, private-network user," Asman said. "Just like anybody else, we're shopping around all the time."

Boeing called for bids on the bulk of its services modernization project in March 1984 and announced last January that negotiations were under way with AT&T.



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SOME THINGS CAN NEVER BE SHARED. OTHER THINGS SHOULD BE.

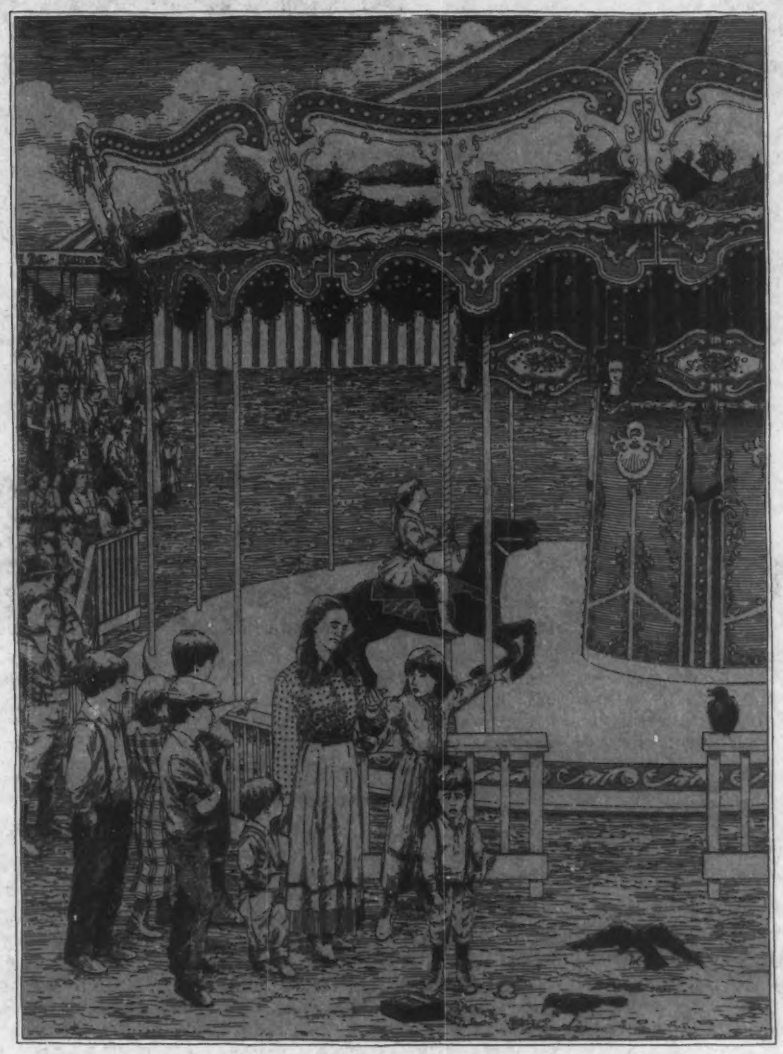
The people who make database software have some strange logic. They tell you information is the most valuable thing in the world. And then they design their products for single-user systems.

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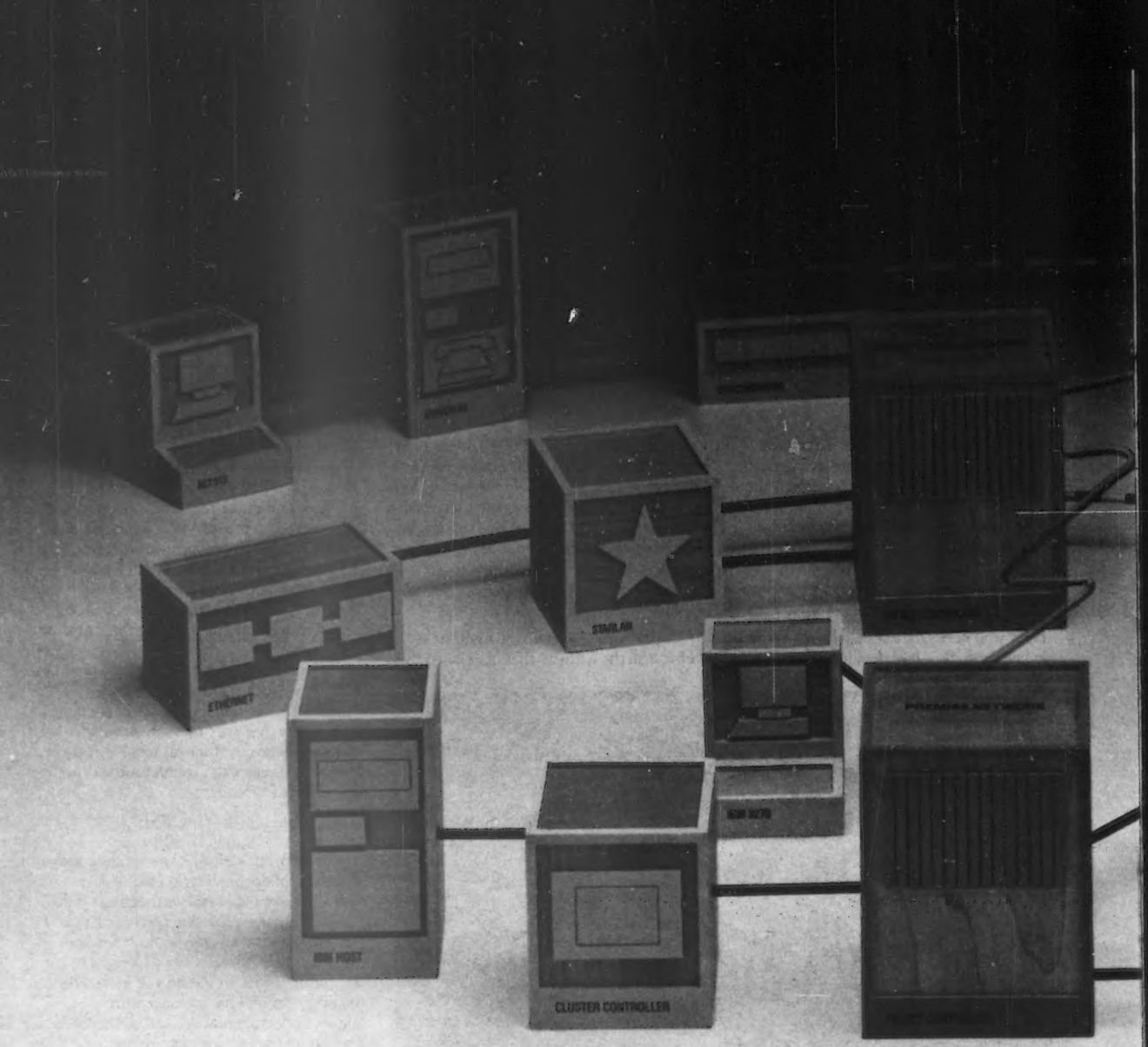


R:BASE 5000 MULTI-USER FROM MICRORIM

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COMMON SENSE IN DATABASE MANAGEMENT
NUMBER FIVE IN A SERIES



ONLY A NETWORK THE CENTER OF YOUR EXPANDING

A local area network. Sure it can integrate some of your stand-alone equipment. But what about the departmental systems you have? And what about next year? Will it be able to handle new applications that come along? Can it grow? Is it a long-term solution or just a quick fix?

The Information Systems Network from AT&T is the data network that can meet your immediate and long-term needs. It's the only network open and flexible enough to integrate the equipment and systems you have now, and willingly accept what the future might bring. It's the data network that can expand with your business—grow from a local to a corporate-wide network.

You can build a strong foundation

Different systems—Incompatible hardware from different vendors—A few stand-alone pieces here and there—ISN can tie it all together.

ISN's open architecture lets it act as the backbone data network that integrates your disparate systems and smaller networks.

Its unique wiring system of twisted pair and fiber optics allows ISN to support the equipment you have now, and the equipment you'll buy later. You can easily and economically add and rearrange equipment. Plus, no matter how far apart devices are, with ISN, you still get maximum network performance.

So once your backbone network is in place, the possibilities are endless. Grow upward, outward, backwards and sideways. With ISN, your options are always open.

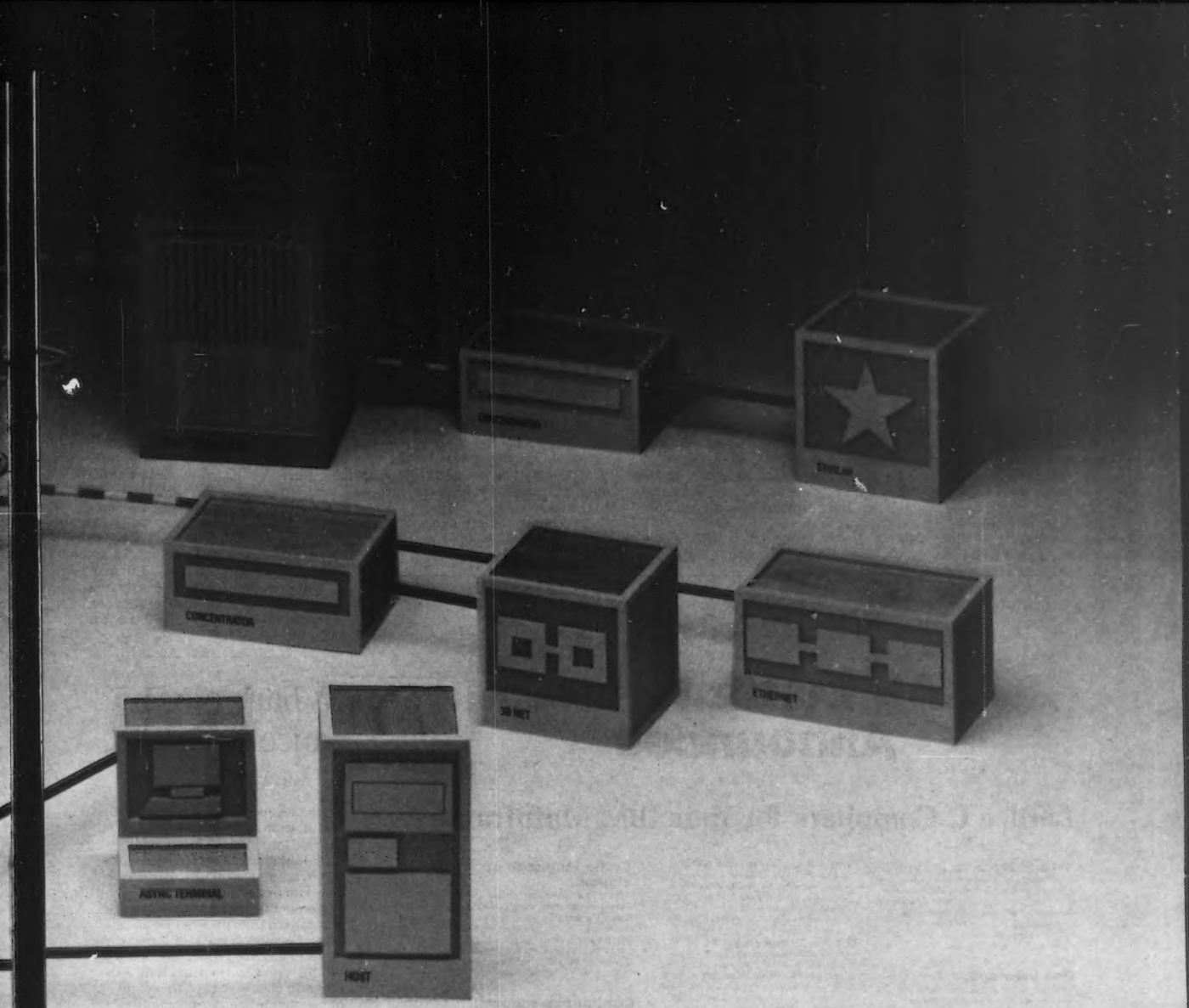
You can break the ties that bind you

At the local level, ISN is a hierarchical star network with a fast-switching Packet Controller at the hub. The Packet Controller is linked to all devices in your network and manages all network communications.

So ISN can set up communication links between all your equipment and systems. AT&T System 85 and AT&T System 75 PBXs, minicomputers and mainframes, isolated Ethernet* systems, AT&T STARLAN NETWORK and 3BNET, smart and dumb terminals, even equipment from IBM— ISN gets it all on speaking terms. All sharing the same resources. All working even harder for you.

ISN even protects your 3270 investment. It lets your Bisync terminals access multiple IBM** hosts. Low-cost dumb terminals and personal computers do the same. Synchronous and asynchronous traffic can travel through your network with the same speed and efficiency.

*Ethernet is a registered trademark of Xerox Corp. **IBM is a registered trademark of International Business Machines Corp.



THIS OPEN AND FLEXIBLE CAN BE UNIVERSE.

With ISN, you're never locked in to one vendor or one location. Since ISN uses the same technology for local and wide-area networking, its growth potential is limitless.

Linking multiple Packet Controllers lets you start with one ISN and grow across a premises. Add another ISN and grow across the city, or across the country. There's nothing holding you back.

You can handle it all

No matter how large your network becomes, ISN still provides fast, reliable communications between all users. With a high backplane and fiber rate of 8.64 mbps, and a very efficient packet structure, ISN maintains a high throughput rate even when traffic is at its peak.

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Premises-wide or nationwide, ISN puts you in command. No matter how large your network gets, you choose the means of control—centralized or distributed.

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The right choice.

Hayes plans synchronous interface standard

HSI to address lack of accepted interface for software developers

By Eric Bender

NORCROSS, Ga. — Hayes Microcomputer Products, Inc. recently announced plans to publish an application interface designed to isolate synchronous communications applications from the differences among various communications hardware setups.

Available next month, the Hayes Synchronous Interface (HSI) "addresses the need for a recognized, accepted interface that software developers can use to provide compatible synchronous application programs," said Dennis Hayes, president of the firm.

Unlike the case in personal computer asynchronous communications, where developers can write to the standard represented by the IBM Asynchronous Interface Adapter board, there is no accepted standard for synchronous communications, Hayes said.

"That's a headache for developers; they spend hundreds of hours writing hardware-specific versions," Hayes said.

He claimed that early response from communications application software firms has been "more positive than we thought it would be; it kind of surprised us."

Compatible with applications

Applications that conform to HSI will be compatible with any hardware device for which an HSI driver is available, a company spokesman said.

The Hayes Synchronous Driver, which provides HSI support routines for the company's communications products, will be licensed to developers for an annual $100 fee, according to the spokesman.

"We invite other hardware manufacturers to provide drivers for their products," Hayes said.

SAS Institute Inc. Announces

Lattice C Compilers for Your IBM Mainframe

Two years ago...
SAS Institute launched an effort to develop a subset of the SAS® Software System for the IBM Personal Computer. After careful study, we agreed that C was the programming language of choice. And that the Lattice® C compiler offered the quality, speed, and efficiency we needed.

One year ago...
Development had progressed so well that we expanded our efforts to include the entire SAS System on a PC, written in C. And to insure that the language, syntax, and commands would be identical across all operating systems, we decided that all future versions of the SAS System—regardless of hardware—would be derived from the same source code written in C. That meant that we needed a C compiler for IBM 370 mainframes. And it had to be good, since all our software products would depend on it.

So we approached Lattice, Inc. and asked if we could implement a version of the Lattice C compiler for IBM mainframes. With Lattice, Inc.'s agreement, development began and progressed rapidly.

Today...
Our efforts are complete—we have a first-rate IBM 370 C compiler. And we are pleased to offer this development tool to you. Now you can write in a single language that is source code compatible with your IBM mainframe and your IBM PC. We have faithfully implemented not only the language, but also the supporting library and environment.

Features of the Lattice C compiler for the 370 include:

- **Generation of reentrant object code.** Reentrancy allows many users to share the same code. Reentrancy is not an easy feature to achieve on the 370, especially if you use non-constant external variables, but we did it.
- **Optimization of the generated code.** We know the 370 instruction set and the various 370 operating environments. We have over 100 staff years of assembler language systems experience on our development team.
- **Generated code executable in both 24-bit and 31-bit addressing modes.** You can run compiled programs above the 16 megabyte line in MVS/XA.
- **Generated code identical for OS and CMS operating systems.** You can move modules between MVS and CMS without even recompiling.
- **Complete libraries.** We have implemented all the library routines described by Kernighan and Ritchie (the informal C standard), and all the library routines supported by Lattice (except operating system dependent routines), plus extensions for dealing with 370 operating environments directly. Especially significant is our byte-addressable Unix®-style I/O access method.
- **Built-in functions.** Many of the traditional string handling functions are available as built-in functions, generating in-line machine code rather than function calls. Your call to move a string can result in just one MVC instruction rather than a function call and a loop.

In addition to mainframe software development, you can also use our new cross-compiler to develop PC software on your IBM mainframe. With our cross-compiler, you can compile Lattice C programs on your mainframe and generate object code ready to download to your PC.

With the cross-compiler, we also offer PLINK86™ and PLIB86™ by Phoenix Software Associates Ltd. The Phoenix link-editor and library management facility can bind several compiled programs on the mainframe and download immediately executable modules to your PC.

Tomorrow...
We believe that the C language offers the SAS System the path to true portability and maintainability. And we believe that other companies will make similar strategic decisions about C. Already, C is taught in most college computer science curriculums, and is replacing older languages in many. And almost every computer introduced to the market now has a C compiler.

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C supports structured programming with superior control features for conditionals, iteration, and case selection. C is good for data structures, with its elegant implementation of structures and pointers. C is conducive to portable coding. It is simple to adjust for the size differences of data elements on different machines.

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Micom unwraps Instanet 6000

From page 37

and control the switch through a system administrator port. An auxiliary port supplies a time- and date-stamped audit trail of all switching activity, including port contention, failure to connect, the reason for the failure, contention queuing and any attempted security violation.

The price for a base switch without interfaces starts at $9,000. Interface prices range from $245 to $650 for four-channel, local-interface modules; $650 to $1,500 for local multiplexers that support four to 28 channels; $2,500 to $4,200 for data concentrators; and $3,600 to $5,400 for IBM gateway modules. The price for upgrading a Micro 600, the company's low-end private branch exchange, to the Instanet 6600 starts at $7,000.

What's No. 1, voice or data?

From page 37

munications gear. Today a typical installation may involve CPUs worth several million dollars and multi-million-dollar communications bills. The scale may soon flip all the way to communications.

Communications is more of a decentralized than distributed discipline. Because of the size, there are more chances of waste, redundancy, billing errors and malfunction. A director in charge of the CPU center has a well-defined responsibility confined to a well-marked four-wall room; the director of communications has a wide-open field, spanning continents, foreign governments, nonstandard equipment and Third World vendors.

This is why, in a typical establishment, the systems end of the house is more relaxed, leisurely and organized, compared with the communications end, where people fight problems on several continents and deal with as many as 200 vendors.

In the information age, communications has become as important as DP, and organizations ought to acknowledge that fact.

There is a key factor that is at times overlooked, ignored or underestimated in some organizations, particularly where communications is subordinate to systems: It is that voice communications can typically require 10 to 20 times the budget of data communications. For example, an organization with $1 million a year in data communications costs can easily find itself spending $10 million to $20 million a year in voice equipment and transmission.

DP professionals often are not adequately qualified to handle the subtleties of telecommunications unless they take a career detour for a few years into the voice arena.

In some organizations where subordination exists, the director spends a large percentage of time following the data issues and very little time following the voice issues — where the potential for the largest savings is achieved.

SYSTEMS & PERIPHERALS

HARD TALK
James Connolly
CW Senior Editor

Niches: Hope for chip mart

With adjectives such as "depressed" and "troubled" regularly being applied to the semiconductor industry, it may seem inconceivable that people would be looking to jump into that business.

But there may be room for start-ups and established semiconductor companies looking for new markets. The best hope for those companies is that they don't get greedy and knock heads with giants like Intel Corp. and Motorola, Inc. in the general-purpose microprocessor field. The theory that a small company can grab a niche in the semicustom or application-specific market lies behind a number of new firms, some of which found venture capital even as the semiconductor market crashed about them in 1984.

One such company is Crystal Semiconductor Corp. of Austin, Texas, an organization that plans to announce and ship samples of its first products in January — 14 months after receiving initial funding in October 1984. The firm drew its management and engineering talent from a variety of major chip companies. President James H. Clardy had been with Texas Instruments, Inc. and Harris Corp., and Vice-President for Marketing T. Allan Hamilton moved over from Intel, while other executives and key investors were drawn from Mostek Corp. and Bell Laboratories.

"It was an odd time to start a company," Hamilton said of the 1984 funding. But he noted that while the semiconductor industry "had just fallen off a cliff," the investors were people who had experience in and understood the semiconductor industry.

The industry slump, with the accompanying layoffs, actually benefited Crystal. Hamilton said, "I don't like to benefit from someone else's misfortune, but traditionally big companies have their security. It is something that precludes a lot of really smart guys from

See **NICHES** page 45

CSPI ties to Microvax II

DEC technology allows move to stand-alone Maxim

By James Connolly

BILLERICA, Mass. — Development of a pair of vector processors by CSP, Inc. (CSPI) was made possible not by the vendor's own technological breakthroughs but by Digital Equipment Corp.'s development of the Microvax II, according to CSPI officials who announced their 32-bit and 64-bit vector processors last week.

"We'd like to say it was a technological breakthrough on our part, but it wasn't. We've been wanting to marry our own technology to something like the Microvax for a couple of years," said CSPI President Sam Ochlis in announcing CSPI's Maxim/32 and Maxim/64 vector processors. He said it was the Microvax II that allowed CSPI, working under an OEM agreement with DEC, to move into the stand-alone vector processing market. The 15-year-old company previously had marketed add-on vector processors for various superminicomputers.

> *'Users have a lot more to do than merely crunch numbers.'*
>
> **— Sam Ochlis, CSP, Inc.**

The Maxim/32 and Maxim/64 are aimed at the scientific and engineering markets.

Ochlis said the coupling of CSPI's array processing technology and the Microvax in a single cabinet or pedestal lets a user do vector or array processing and run general office automation or administrative applications. "The scientific computer user gains another dimension by using the new Maxim. In the real world of scientific computing, users have a lot more to do than merely crunch numbers. For example, a recent study of design engineers' work habits determined that they spend only about one-third of their time actually designing and/or using their dedicated computers," Ochlis said.

He claimed that a common problem with running extensive arithmetic computations on a nondedicated superminicomputer limits other users' access to that system.

The single-precision Maxim/32 is based on CSPI's Mini-Map array processor family. A basic configuration includes a 32-bit floating-point array processor, 1M byte of data memory, a 5¼-in. chassis backplane, development software, a Fortran compiler and a Microvax II with 5M bytes of random-access memory, a 91M-byte streaming tape drive, a 71M-byte Winchester disk

See **CSPI** page 45

Start-up broadens processor base

By Peggy Watt

OREM, Utah — Icon Systems and Software, Inc., a year-old start-up supported by part-owner Sanyo Electric Co. of Japan, quadrupled its product line just as its first supermicro system was shipped.

Citing a whipsaw effect wrought by the wavering exchange rate between the yen and the dollar, Icon officials announced an expansion of their MPS 020 line to offer a step configuration below their previous dual-processor system to keep the lower rungs priced at less than $20,000.

The Sanyo/Icon MPS 020 line is based on the 32-bit Motorola, Inc. 68020 CPU with an Intel Corp. 80286 chip for compatibility with the IBM Personal Computer AT. It also has a disk cache processor and Motorola 68881 floating-point processor. It is said to support up to 5 million instructions per second. It supports three operating systems: AT&T Unix System V, University of California at Berkeley Unix 4.2 and Microsoft Corp. MS-DOS, and emulates IBM's 370 operating environment. Icon officials announced the Pick Systems Pick operating system will soon be available for the line. All configurations also have four communications ports.

The high-end MPS 020-23 (previously called the MPS 020-2) is a 32-user supermicro based on two Motorola 68020 microprocessors, with 1G byte of virtual memory address space, disk cache memory, two 20M-byte hard disk drives, a 20M-byte streaming tape backup system and an optional floating-point coprocessor. The system was scheduled to ship in November and was to be priced at less than $20,000, according to Andrew H. Olson, director of corporate development. The fluctuating monetary exchange rate prompted Icon officers to boost that configuration's price

See **START-UP** page 45

INSIDE

Canon U.S.A. unwraps a laser graphics printer/**44**

Xerox releases an in-house ion deposition printer/**44**

NEW THIS WEEK

- McDonnell Douglas offers two new minicomputer systems
- Sony introduces a writable optical disk system

For more on these and other new products, see pp. 63-79.

INSTANT ANALYSIS

"IBM is seven times bigger than us. . . . We have great respect, or we used to anyway."

— Ken Olsen, founder and president of Digital Equipment Corp.

We rent out as much equipment as Ryder rents out trucks.*

Personal computers, terminals, printers, modems. Loaded with options: rentals, leases, options to buy, volume pricing. Rent the best from the best: Leasametric

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*Based on inventory for Vehicle Leasing and Services Division, which does business as Ryder Truck Rental. source 1983 Ryder Systems, Inc. Annual Report and Third Quarter Report, 1984.

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Xerox unwraps large volume, ion-deposition print system

Aimed at central data centers

By Donna Raimondi

ROCHESTER, N.Y. — A printing system for centralized data centers was unwrapped recently by Xerox Corp.

The printers are targeted at uses that require large volume but not necessarily publishing quality, spokesman Mike Howes said. He gave examples such as inventory lists and internal reports that are everyday tasks for a printer but that do not require laser printer quality.

The Xerox 4060 computer printing system's ion-deposition engine is manufactured by Delphax Co. in Westwood, Mass., a company in which Xerox owns a 50% equity interest.

The system is said to print at speeds up to 60 page/min. and can handle an average printing volume of about 500,000 pages per month, the vendor said. The printer operates on-line to an IBM or plug-compatible host mainframe computer by emulating IBM 3811, 3211 or 4245 printers. It prints on standard 16- to 24-lb, 8½- by 11-in. cut-sheet paper with a print resolution of 240 by 240 dot/in.

The $70,000 base system includes a 10M-byte rigid disk and an integral offsetting output stacker and large-capacity sheet feeders that are manufactured by Delphax.

The controller module includes a menu-driven operator display terminal and keyboard; a 10M-byte rigid disk drive for internal storage of fonts, electronic forms and job descriptions; and a 5¼-in. flexible disk drive for alternate font, form and job description loading.

Also included are interfaces to IBM 3811, 3211 and 4245 channels.

Options include a 40M-byte rigid disk drive that costs $1,995 and expanded storage for up to 16 fonts.

Three software options that cost $4,995 each include a Xerox-designed forms description language called PC-FDL that allows users to create and compile forms on a Xerox 6065 personal computer or on an IBM Personal Computer with a rigid disk. It then allows users to load forms on the 4060's flexible disk drive for printing.

A second software option, the Xerox Print Manager, resides on the host computer and interfaces the 4060 to IBM's MVS/JES2 environment. The third option, Xerox's Host-FDL, enables forms creation and compilation on an IBM mainframe operating in the MVS/JES2 environment.



Canon equips laser printer with graphics

LAKE SUCCESS, N.Y. — Canon USA, Inc. has released a laser beam printer with graphics capabilities. The LBP-8 A2, with a top speed of eight page/min., comes with either an 8-bit parallel or an RS-232C interface and costs $4,300.

The printer, a follow-on product to the $3,000 LBP-8 A1 that was made for word processing-type applications, is in response to users' demands for more sophisticated graphics capabilities, a spokesman said. The system is useful for short-run, low-volume in-house publishing tasks such as manuals, he added.

Equipped with 1M byte of random-access memory, the LBP-8 A2 is said to allow 300 by 300 dot/in. raster graphics on a 8½- by 11-in. page. Its built-in Canon Virtual Device Metafile software provides vector graphics output, the vendor said.

The system is equipped with Canon's LBP-CX engine that employs a semiconductor laser and replaceable toner cartridges.

Niches: Hope for chip mart

From page 43

taking a flier on a smaller venture capital-funded start-up company. As it turned out, big companies aren't so secure, as evidenced by the layoffs that many of them have seen.

So, a lot of these guys have taken the opportunity to look outside. As a result we've been able to pick up some people we probably wouldn't have if the industry was booming."

In Crystal's case the niche market and the people they wanted to hire dealt with high-performance analog integrated circuits — what the company calls its Smart Analog circuits.

Hamilton claimed that there are only about 250 analog design engineers in the world and that his company has hired 20 of those experts.

Crystal, which will use contracted foundries rather than develop its own fabrication facilities in the near future, envisions its digitally enhanced analog circuits being used in data acquisition subsystems and in telecommunications systems. Hamilton said the product families will address telecommunications, data communications, industrial automation, instrumentation and the custom semiconductor market.

Crystal and a handful of similar companies are targeting specific markets with a specific type of chip. Although most of the key people have their roots in the large, multipurpose semiconductor companies, Crystal, for example, shows no outward sign of going after those big outfits.

"I came from Intel, and I would hate to take on Intel in the microprocessor game, because that is where they eat. Every resource they have is there for ensuring their microprocessor superiority or at least penetration in numbers of units sold. So, it is pretty tough to take Intel on in that game," Hamilton noted. "I think everybody has continued to carve out reasonable niches, and there will continue to be niches. Even those niches today are increasing in size to where you can have a very viable company based on a niche."

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CSPI ties to Microvax II

From page 43

drive and DEC's MicroVMS operating system. The CPU memory is expandable to 9M bytes, and the array processor data memory is expandable to 12M bytes. The base configuration costs $65,000.

The double-precision Maxim/64 is based on CSPI's full-size Map family. A basic configuration includes the same Microvax package as used in the Maxim/32, a 16-slot chassis with four expansion slots, a 64-bit floating-point array processor, 16M bytes of data memory and 1M byte of program memory. The basic configuration costs $165,000.

CSPI, which claims an installed base of more than 2,000 units for its larger processors, reported that both Maxim packages are scheduled to be available in 90 days.

Start-up firm broadens base

From page 43

tag to $24,750 and to offer three new, upgradable systems below it.

The Icon MPS 020-20 will be the equivalent of an IBM Personal Computer AT compatible, supporting eight users, with a 20M-byte hard disk drive and 20M-byte streaming tape backup system. It will cost about $12,500 with a Sanyo monitor.

The 020-21 model will build on the base model and include a 1M-byte disk cache memory with dual processor. It will sell for $16,000.

A step below the high-end model is the MPS 020-22, an AT&T Unix system priced at $21,000.

Icon also recently reached an agreement in principle with PC America to distribute the Sanyo/Icon product line throughout the U.S., with several other agreements still pending, Olson said.

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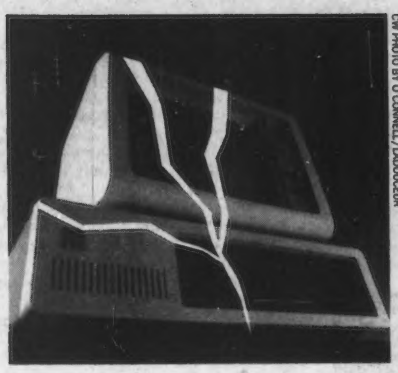
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IN DEPTH



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Technical review exposes weaknesses of micro systems

Ad hoc personal computer development leaves corporate systems vulnerable to scheduling glitches, faulty logic flow and undue reliance on inadequate hardware. A complete technical review yields greater overall control.

By Farid Naib

More than one hundred trucks and truckers of a major consumer products firm sit idle. The reason? Not economic depression, not a lack of orders to fill — the culprit is an overextended personal computer-based data base system.

At another major corporation, employees worked until 4 a.m. one day last year. Once again, the culprit was a personal computer-based accounting system producing reports that stood in the critical path of the monthly book closing.

One of the great advantages of personal computers fosters one of their great weaknesses. Personal computer-based systems are so simple to use and operate that they often come into use in corporations without any formal studies on the viability and integrity of the system.

Jack Musgrove, operations director of PA Computers and Telecommunications, says, "The challenge in using the personal computer is to make sure that it is integrated into the overall system architecture. One of the main dangers in ad hoc personal computer development is that the data integrity inherent in modern information systems may be compromised."

Alan Cowan, information systems manager of PA Consulting Services UK, adds, "Personal computers are only one way of putting computer power on a user's desk. It must not be assumed that a personal computer always represents the most cost-effective option. Indeed, a personal computer may introduce more problems than it solves if it has not been specified with a clear understanding of the business needs to be addressed."

One way of ensuring a good fit is to conduct a technical review of the major personal computer-based systems within a corporation. A technical review involves examining a system's components, its function, the degree to which it fills end-user needs and its importance to the firm.

Typically, the review is conducted by a member of the DP or MIS department who is knowledgeable about the personal computer-based system in the firm or who has expertise in the personal computer market generally. An individual in charge of personal computer support would be an excellent reviewer. Any staff member contemplating this type of review needs a good familiarity with third-party, as well as proprietary, equipment and software. Generally, end users do not conduct technical reviews.

The successful review

As a part of the review, users make suggestions for improving the system, which are then subject to evaluation. The suggestions are often quite cost-effective and practical. For instance, in the case involving the corporation's accounting system, a $200 surge supressor might have prevented the problem.

The successful technical review will answer three sets of questions. The first set examines what the system does and how. Basically, this provides an overview of the

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Farid Naib is an independent consultant based in Philadelphia. He is co-owner of FX Systems, Inc., a foreign exchange risk management software house.

system from a functional and technical standpoint.

The next set of questions has to do with the identification of potential problems or areas of concern. These questions will be guided by the findings of the first set of questions.

The final set of questions takes the form of "What can we do to improve the system?" Suggestions should be made as to how to improve the system, with detailed information on how each suggestion would improve the sytsem.

How does one conduct a technical review? While every system requires special consideration, one can determine a rough blueprint. The blueprint of one successful procedure, involving five steps, follows.

The big picture

The first step in conducting a technical review is to look at the personal computer-based system as a whole and ascertain what function the system performs, how it is related to other functions within a firm and how important it is to the overall operations of the firm.

The manager conducting the technical review then can write a description of the system and what would happen to the firm if it were inoperative for one minute, 10 minutes, one hour, one day and one week. Stop the time series at the point the firm would go bankrupt without the system.

Once the description and resulting problems are down on paper, let the system's users see the analysis and make comments. Try and get the input of people who rely on the system. Solicit any management help available. The broadest possible range of opinions can only help, as often dissimilar points of view shed more light on the system manager's task.

For example, consider a hypothetical personal computer-based distribution system. Asking only the warehouse employees about system efficiency might solicit this sort of response: "Well, the customers always have an extra supply of parts, so if we're a day late, it won't hurt much." However, a marketing person at the same company might respond, "Being a day late would severely damage our hard-earned reputation for reliability and give our competitors an opening right into our market."

The result of this stage of investigation should accurately describe the system's importance to the firm and the relationships the system has with other systems.

System architecture

The next step in the technical review is to create a flowchart of the functional operation of the system. Every input and output possibility should be listed as the reviewer outlines the system architecture.

Three areas must be considered: hardware, software and personnel. Usually, each carries equal weight in the system's successful operation.

Someone particularly knowledgeable about personal computer hardware should conduct a physical examination of the system, if possible. Otherwise, system components can be overlooked, when their physical condition in fact may have real impact on the system as a whole. For instance, what is reported as an operational printer-to-personal-computer parallel cable could turn out to have frayed ends and duct-taped insulation, reducing its value and reliability in terms of the review.

Hardware remains the easiest category to examine. Reviewers must consider the CPU, expansion cards, printers, plotters, communications equipment (modems), local-area networks, cables and so on. Any service policies fall into this category of the review, as do any backup systems.

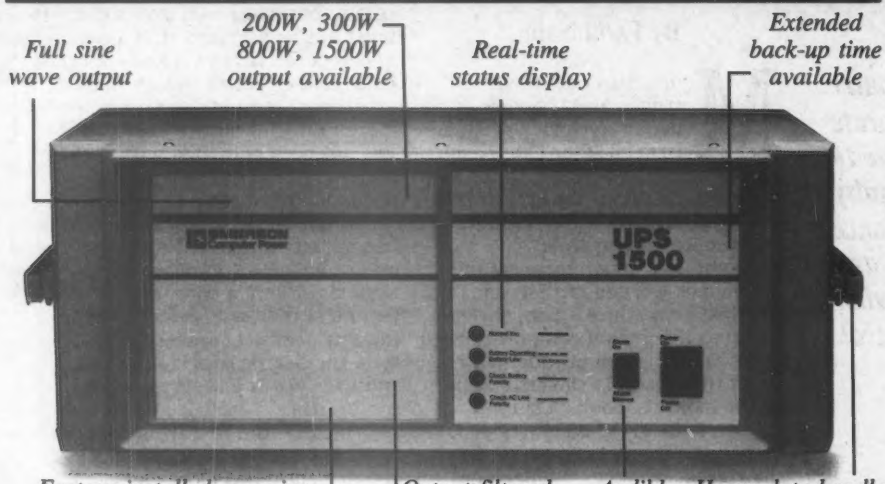
Next, list all the software packages used in the system. Once again, a knowledgeable person should compile this information, since an application system's software list often leaves out important components. The reviewer should note the version number of each purchased product and check to see if the registration card of each package has been posted, as software publishers often send updates.

For software contracted or developed in-house, check for technical documentation, including source code. Also note where different software packages interface in the system. If, for example, the company uses an Ashton-Tate Dbase III application system in conjunction with a third-party sort routine, the interdependence will be important to flowcharting.

The reviewer should examine the various procedures for turning on the system and for backing up the data. It is remarkable and a bit horrifying how many systems are not backed up on a regular basis. Too many distraught users have lost

> *Let the system's users see the analysis and make comments. Try and get the input of people who rely on the system. Solicit any management help you can find. The broadest possible range of opinions can only help, as dissimilar points of view often shed more light on the system manager's task.*

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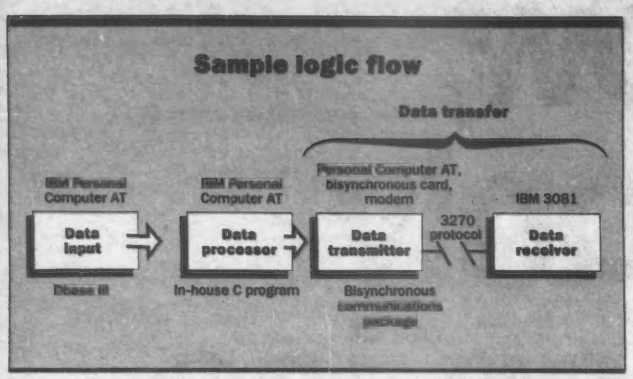


Figure 1: Mapping out each system component in the logic flow brings to light system bottlenecks and critical components.

their non-backed-up data. System users should be interviewed informally, both to determine how often these established procedures occur and to ascertain each end-user's degree of computer literacy.

Handling downtime

An important question to ask at this time is what the operators should do if the system becomes inoperative. Are there recovery systems in place? Whom do the operators contact?

For example, if an operator reports any problems to the supervisor, who subsequently reports them to the MIS department, then simply locating the supervisor becomes a critical part of correcting the problem. A better plan might be for the operator to contact both the supervisor and the department on his own.

Another thing to consider is what procedures are used for unusual situations. For example, consider an inventory system. What happens if a shipment is received in several lots or is short?

A related issue is the problem determination guideline. For example, can the operator tell if a problem lies in software or hardware and, if so, in what piece? A problem determination sheet might point to a device time-out error as a problem in a printer to which the operator could then attend.

Following this investigative procedure, the reviewer should document the system logic flow. The resulting document will aid in both analyzing and supporting the system.

The part that each hardware and software component plays should be noted (Figure 1). Then, the existing backup and recovery procedures should be examined to determine how much work has been done to the system to date.

For all practical purposes, this concludes the investigative portion of the technical review. The collected data now must be analyzed.

Evaluation criteria

Following the analytical work, the review requires evaluation criteria. The evaluation criteria consist of a list of those things that the system must or should provide. Typically, criteria would include the following:

- Reliability. Ideally, the system must always be up and running. Individual firms must determine how critical uptime is to their operations on a minute-by-minute, hourly or daily basis.
- Speed. Systems that lie in the critical path of the firm's operations should be as fast as possible.
- Expandibility/flexibility. New demands will be placed on the system from time to time. At some point, the system may need additional capacity, or users may need to add new fields. The system should be structured to allow for these upgrades.
- Ease of use. If the system supports a large number of end users, users unfamiliar with the system or users that are not computer literate, the firm may require ease of use to be included as an evaluation criteria.
- System security. The confidential nature of the information may make system security a concern.

This is by no means an all-inclusive list; rather, it should be used as a guide to determining relevant evaluation criteria.

Closely linked to determining the evaluation criteria is the step of identifying the potential problem areas. The review should pinpoint those problems that would explicitly affect one or more of the evaluation criteria. For example, a very slow data base sort identified as a problem area probably affects a speed concern. Or, the existence of unscrambled data files might well affect system security.

No attempt should be made to rectify these areas at this point in the review. Instead, they should be addressed in the next step.

At this point, the reviewer can start to consider ways to improve the system. The review has already generated a number of documents: system components list, flowcharts or logic flow diagrams; a problem determination sheet; a list of evaluation criteria; and a list of potential

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problem areas. A review of the documents at this point will be helpful in getting the appropriate feel for the system prior to the suggestion-making stage.

After reviewing the material, the reviewer can accept suggestions for improving or modifying the system. At this point, no analysis of the feasibility or desirability of implementing the suggestions should be made. Wait to perform this analysis until after completing the suggestions.

To aid in this future evaluation, use a common format for all suggestions. The key components of the format are as follows:

- Suggestion. A brief description of the suggestion and what it does.
- Areas impacted. The areas of concern addressed by the suggestion.
- Reason. A description of how or why the suggestion affects each of the areas of concern addressed by the suggestion.
- Detail. Technical details regarding implementation of the suggestion.

There is no hard-and-fast guideline to determining in what areas suggestions should and will be made. However, it is possible to make a list of the likely areas, such as the following:

> *"There is no hard-and-fast guideline to determining in what areas suggestions should and will be made.*

Take advantage of new technology. For instance, basing system communications on a 1,200 bit/sec. modem in a company concerned with speed would make the use of a 2,400 bit/sec. modem a valid suggestion. Or relying on Dbase II when the company's capacity is a concern would make using Dbase III a valid suggestion.

Examine software version numbers. It may be that recent enhancements in a software package will help the system in one way or another.

For example, a system written several years ago in Lifeboat Associates' Lattice C could perhaps be recompiled under a new version of Lattice to take advantage of a math coprocessor chip, helping to improve system speed.

Look at the various inputs into the system. For example, don't forget to consider such possibilities as an uninterruptable power supply if system reliability is a concern. In the same vein, if data security is a concern, such as for a military subcontractor, consider the possibility of shielding the personal computer against radio frequency emissions. If files are being downloaded from a mainframe to the personal computer, check the record length to determine if the optimum block size is being used.

Make sure that any efforts directed at such things as power integrity are carried out fully. For example, if a system's power supply is fitted with a surge protector, make sure that the modem, if there is one, is also equipped with a protector. Or, if system redundancy is used as a backup method, make sure that the redundancy extends to all key components.

Do not ignore simplification possibilities or downplay suggestions that are very easy to implement. For example, a system with two personal computers that must transfer data offers several connection alternatives. The local-area network now in place could be replaced by a much

Ranking suggestions

By priority level	
High level	Suggestions in this category are essential to the viability of the system being reviewed and should be performed as soon as possible.
Medium level	Suggestions in this category improve the system being reviewed in some way; however, the improvement does not merit immediate attention.
Potential high level	These suggestions should be further evaluated. If an evaluation proves favorable, the suggestion should be moved to the high level.
Potential medium level	These suggestions should be further evaluated. If an evaluation proves favorable, the suggestion should be moved to the medium level.
Low level	This category contains those suggestions that do not directly affect the operation of the current system.
By difficulty of implementation	
Simple	These changes can be implemented within one day and pose no difficulty.
Medium	These suggestions involve more time, but do not require a major reimplementation of the system.
Complex	These suggestions contain major tasks that involve substantially modifying the system being reviewed and/or increasing the functionality in a significant way.

Figure 2: End-user suggestions must be evaluated before implementation.

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simpler null modem arrangement. Or perhaps some inexpensive software change such as utilizing a directory structure might make the system easier to manage.

Examine the technical documentation of the system. If the documentation is incomplete or even nonexistent, good suggestions might focus on rectifying this problem.

Consider the various problem possibilities and the procedures in place to deal with them. Are the procedures adequate? Are the personnel responsible for implementing the procedures aware of their duties? All of these can form the basis for system suggestions.

Finally, **don't forget to consider preventive maintenance.** For example, if date or time are important and the system uses a battery-powered clock, establish a semiannual battery change. Perhaps establish other preventive maintenance measures, such as checking the disk drive alignment on a regular basis.

Ranking suggestions

The review process generates a wealth of suggestions on how to improve the system in one way or another. The reviewer will need a ranking mechanism to determine which suggestions should be implemented. The most expedient way of doing this is to rank the suggestions by priority and then by difficulty of implementation.

By priority. Five priority categories (high level, medium level, potential high level, potential medium level and low level) generally breaks down the suggestions in a useful way (Figure 2).

By difficulty of implementation. Some of the suggestions made will be rather simple to implement. Others will involve extensive redesign of the system being reviewed. The suggestion should be ranked according to difficulty of implementation. Three rankings should be used: simple, medium and complex.

Generating a matrix. Once the suggestions have been ranked by priority and difficulty, creating a matrix based on point values that the reviewer establishes is a simple matter. Assigning point values to suggestions cannot readily be formulated; rather, it is a judgment call based on the reviewer's experience and knowledge of the specific needs of the firm.

Obviously, those suggestions that have both high-level priority and easy implementation should be attended to immediately. Some further thought will have to be given to the other suggestions in terms of implementation. Different firms will have different cutoff points in terms of what suggestions will be implemented.

As more and more personal computer-based systems come into existence, some effort must be made to determine properly the viability and integrity of these systems.

Many personal computer systems mature with major potential problems. Managers often overlook these problems because of the relative ease of getting a personal computer-based system up and running.

Conducting a thorough technical review can help identify these problems and lead to the department taking steps to prevent them. Otherwise, system users and managers will be forced to live under the shadow of Murphy's Law. ■



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IN DEPTH



ILLUSTRATION BY P. CHARLES L'ADOUCEUR

Black-box technique automates quality control

This familiar test can be used as an automatic verification process to speed programs into production. With one-command start-up, brief test case development and concise reporting, black-box testing can enhance the current quality control effort.

By Rusty Williamson

DP and MIS staffs have devoted great quantities of time and effort to developing workable software testing systems. Methodologies and techniques abound, but the real world of competition, rapid development and limited resources leave little room for their use.

In a support environment of ongoing enhancements and expansion, the continual flow of programs that need testing can make the quality control situation next to impossible. Enough time is not always available to create adequate test cases or to analyze data base updates properly for each modification.

Heavy work loads and limited resources may reduce the average software testing done per program to three transaction types run on three devices. Programs are then forced to face the cruel world of production, where 300 devices endlessly bombard the system with hundreds of transaction types at 100 times the throughput.

In some cases, dusting off an old "black-box" testing technique can help. Used as an automatic verification process, black-box testing acts as a final system shakeout. These tests can help assure that new or modified programs being released to production will perform — without error — those functions that are vital to the company.

Basically, black-box testing treats the system being tested as just a box, without tracking or considering what occurs inside. DP staff inputs preplanned data into the system and compares the output, usually files or device messages, with data known to be correct (Figure 1 page 56).

Advantages of automation

The black-box testing technique used as a system or subsystem verification process offers several advantages:

- It can be completely automatic, using one-command start-up. As black-box testing does not require extensive test case development, data base preparation, equipment preparation and usage or transaction entry, it frees quality control personnel to expand the scope of other testing, such as local or program-level testing, error recovery and reporting testing, documentation review.
- It can effectively provide simulation — of both device types and transaction variety — that may not be possible because of time or equipment limitations.
- It accepts new temporary or permanent test cases easily, allowing the automatic-verification-process testing scope to keep up with the system's growth.
- It can assure that the overall functionality of the system has not been distorted by some seemingly minor or unrelated program change.
- It produces a concise report on the outcome of tests.

In practice, DP staff places new or modified programs into a disk

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Rusty Williamson is a programmer/analyst for Gascard Club, Inc., a Del Mar, Calif.-based firm that serves a network of independent petroleum marketers.

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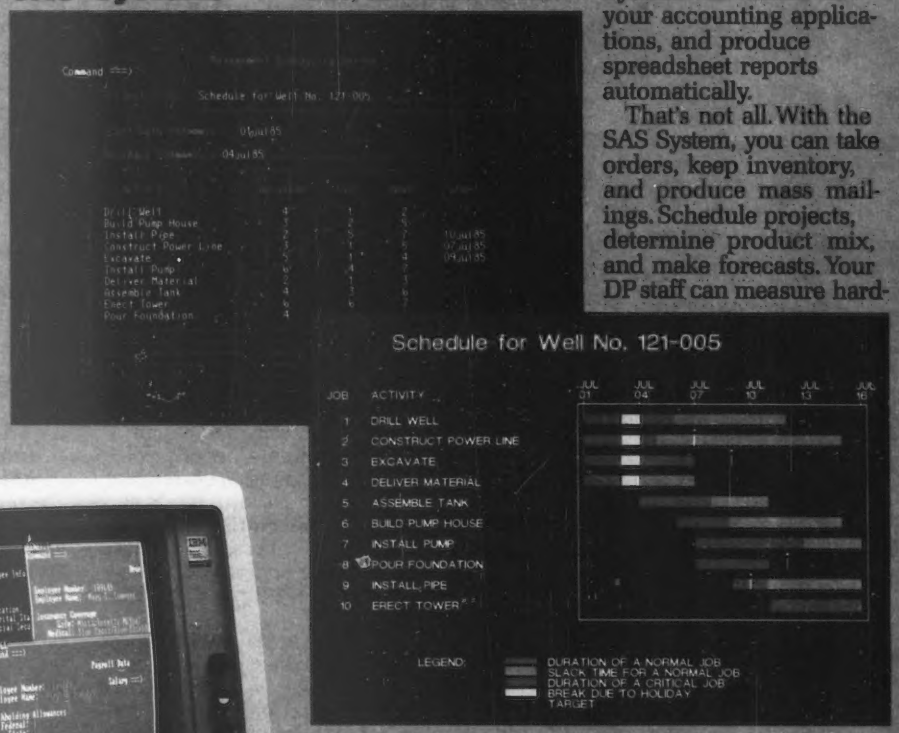
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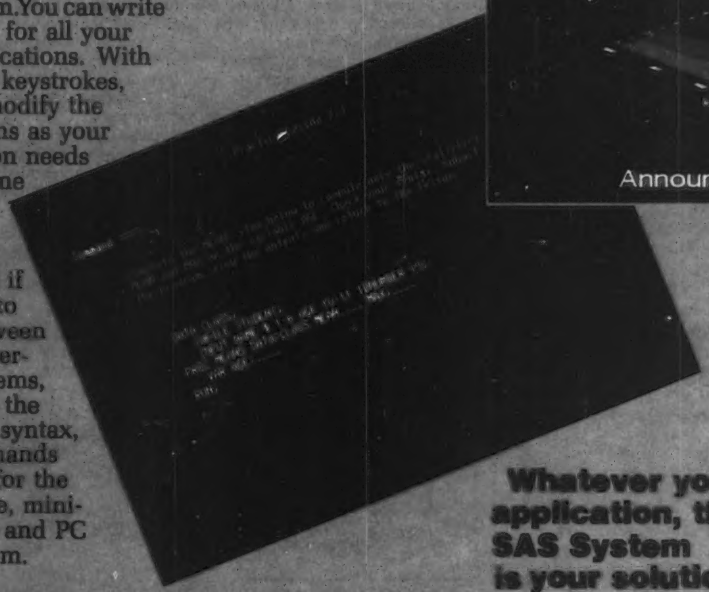
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volume set aside for this purpose. A test staff member types a single command into a terminal, and half an hour later a report prints out. The report might say that 200 transactions have been run through the system and that the system has or has not functioned correctly. The automatic verification process yields results quickly and conveniently.

Conditions of use

Several general considerations apply to the development of this quality control tool by any company.

The automatic verification process must be formed by the programs and files being tested. The less code and process manipulation or simulation introduced into the system, the better. By the same token, the way test data is collected and re-fed to the system should be simple and originate from real devices whenever possible.

The environment also must be controlled and self-contained. The data base has been set up to reflect certain circumstances and must not be modified inadvertantly.

Recognizing the limits of the verification process is also vital. The process may not verify certain programs or transactions. Everyone concerned should know this limitation.

In addition, for most companies, ease of development is a must. The automatic verification process must cope with future needs. Ease of test case maintenance and the ability to introduce special, temporary test cases are also desirable.

The verification process should be self-testing. Running tests with the same programs and data should always produce the same results. Its design and use should be as simple as possible.

Last, but not least, the automatic verification process should be a tool to enhance the current quality control effort. It should not be relied on solely for a system's verification.

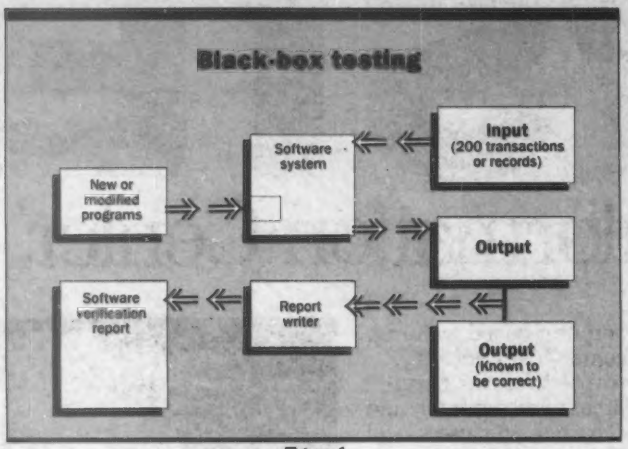


Figure 1

A test case

The software system or subsystem subject to the black-box automatic verification process could take a variety of forms. The input and output could consist of data base files, transaction files, machine sensors, on-line automated teller machines, point-of-sale devices or other terminals and output devices. The software system at the center might be for batch billing, order entry, machine monitoring, credit authorization or electronic funds transfer.

Figure 2 shows an on-line credit authorization system used as an example. In this system, a host computer receives and sends messages to a network of on-line terminals. The system references and updates a data base. In the on-line credit approval system, the network terminals function as both the input and the output devices.

In the automatic verification process, the software system is a copy of the production system in use. The automatic verification data base represents a scaled-down version of the real one. The automatic verification system in the example uses three on-line terminals standing in for the three varieties supported by the company. As shown in Figure 2, the capture of control input and output data is used later by the verification process when verifying the system.

Overview

A step-by-step overview of the development of this automatic verfication process is shown below.

System code modifications (step 1) performed by the programming department should be kept to a minimum. For this sample system, four new system functions will be required at points 'a', 'b', 'c' and 'd.' All these added system functions can be turned on or off — allowed to execute or not — by switches. These switches can be controlled by an input file, a parameter passed with the RUN command or a compiler switch.

Function 'a' turns on and off the opening and reading of real network terminals. Point 'b' opens and reads a file of captured network terminal messages that also contain a displacement time stamp (time elapsed since the system was started).

The function added at point 'b' releases these terminal transactions to the system according to the displacement time stamp. The displacement time-stamp and release control logic allow multiple-step transaction scenarios to occur in their proper

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order. These scenarios include transaction requests, authorization responses and transaction completions.

Point 'c' takes messages coming from the network terminals, adds a displacement time stamp and writes this data to the file read by 'b'. Point 'd' writes all system responses to the network terminals to another file.

The reason for these changes and the way they work together to create the automatic verification process will become clear in a moment.

Test case development (step 2) must produce test cases that represent system functions vital to the company. Closed, open or overdue accounts, credit limits, restrictions and transactions to be run on the terminals all must be documented.

Creating automatic verification systems (step 3) requires that the entire production system be copied to a disk volume set aside for this purpose. As many network terminals as possible are connected to the new automatic verification system; in this case, there are three. All records are deleted from the data base in order to start fresh.

Set up automatic verification pre-data base (step 4). Data determined by step 2 (accounts, credit limits and so on) is set up on this new data base. Once established, the automatic verification pre-data base must be preserved, so a copy of this data base will always be used.

Create automatic verification post-data base (step 5). As shown in Figure 2, the automatic verification system starts up in its "data capture" mode, and operators input the transactions determined in step 2. Switch 'a' is on, allowing the system to communicate with the test network terminals. Switch 'b', which controls a file's reading of terminal transactions, is off (inactive).

Switch 'c' is 'on,' taking transactions being input from the terminals, adding a displacement time stamp and writing them to a file called the automatic verification terminal transaction file. Switch 'd' is also on, writing system response to the terminals to a file called the automatic verification terminal response file.

A copy of the automatic verification pre-data base is referenced and updated. After this data base is completely updated by all the terminal transactions, it becomes the automatic verification post-data base. The terminal transaction and terminal response files now contain all the transactions and responses generated. All of these must be preserved so they can be used later.

Verification of the automatic verification process output (step 6). After the post-data base and terminal response file are updated, qualified personnel should check both manually. It is imperative that both of these are updated correctly, as they will be the yardsticks that measure system correctness.

This manual verification can also act as an audit of the current production system, which is presumed to work correctly. Once verified, both the automatic verification post-data base and terminal response file are cut off from the automatic verification system and preserved.

Set-up of report writer (step 7). Future automatic verification process test-mode runs updating the pre-data base will produce an automatic verification test data base and automatic verification test terminal response file. Test staff should now develop a process to compare post-data base and terminal response file (correct results created in step 5) to these test versions and create a report on any differences.

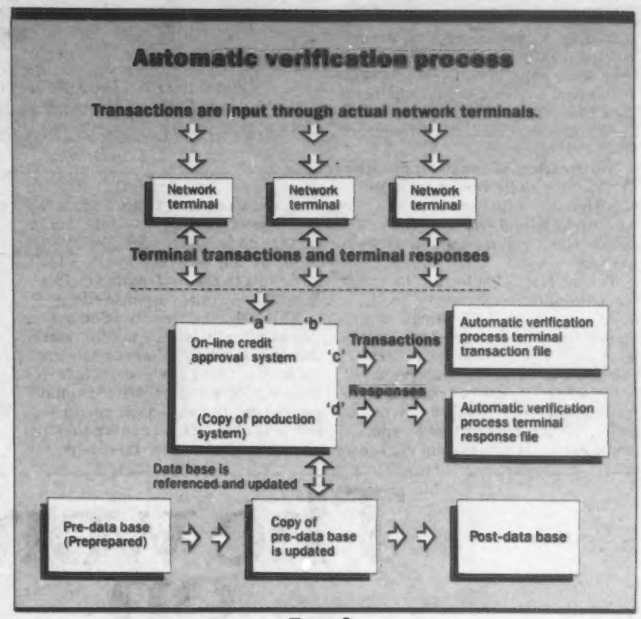


Figure 2

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Ideally, a vendor-supplied report-writing utility should be used rather than an in-house developed program. The report writer should compare all data base files, not just those where updating is expected. All differences should be reported.

Verification of consistency (step 8). The automatic verification process should create the same data base updates and test terminal response file if run over and over with the same system.

Testing staff should run the system over and over to verify itself, using the automatic verification process in its testing mode. Here, switch 'a' is off, cutting off network terminals from the verification system.

Switch 'b' is now on, reading transactions from the terminal transaction file (created in step 5) and feeding them to the system via the displacement time stamp. Switch 'c' is off, as capturing terminal transactions is no longer needed. Switch 'd' is on, writing system responses to terminals to the automatic verification test terminal response file.

> *The automatic verification process should enhance the current quality control effort and not be relied on solely for system verification.*

This automatic verification system eventually will be used to verify the system when enhancements are made to it; now, however, it is testing itself. The report writer should verify that the automatic verification test data bases and terminal response files remain consistent.

Using automatic verification command file (step 9). Most operating systems or their command interpreters will execute files of commands. In most cases, the test process can make use of these types of files or some other method so the operation of the automatic verification process (file copying, run commands and so on) can execute via a single command.

Automatic action

Now the automatic verification process can be put into action. The testing staff places new or modified programs coming from the programming department on a disk volume set aside for this purpose. The automatic verification command file executes, performing the following functions:

- The new or modified programs are included in the automatic verification system. Any original programs being replaced are saved.
- A copy of the automatic verification pre-data base is put in place, and the test terminal response file is cleared out.
- The verification system runs, reading in the terminal transaction file, referencing and updating the pre-data base (creating the automatic verification test data base) and writing terminal responses to the test terminal response file.
- After all transactions have been processed, the report writer goes to work comparing the newly updated data base and response file to their counterparts, which are known to be correct. It then produces a report that shows any inconsistencies.
- The system is restored to its original state; all new programs included in step 'a' are removed and the original ones returned.

Only when the new or modified programs pass all testing (the automatic verification process and others) and are placed into production do they become part of the automatic verification system. All older versions are then purged or archived.

The actual use and application of this technique will, of course, vary from system to system. One verification process may check an entire system as depicted in the example, or automatic verification may be applied at the subsystem level.

In determining if an automatic verification development effort would be worthwhile, record the bugs that slip through the quality control safety net and into production. The percentage that would have been caught by an automated verification process is fairly easy to see. ■

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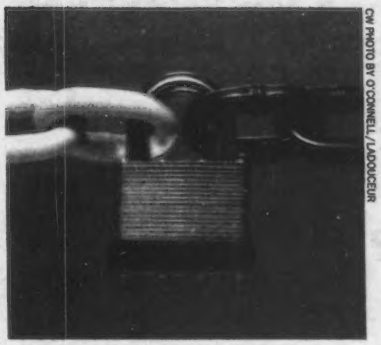
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IN DEPTH

DP alliance bolsters security

MIS managers are well advised to forge a strong link between the security officer and the organization's internal DP auditor, whose jobs promote a single goal: protecting the organization's assets from intrusion. Together they can sell top management on the need for improved security measures.



CW PHOTO BY O'CONNELL/LOOCKERMAN

By Michael Sobol

An organization's data processing security officer and its internal DP auditor approach their jobs from different perspectives — the auditor from outside the DP shop, the security officer from within.

Even when both professionals respect the demarcation — as they must if they are to perform their jobs properly — they will cross paths often. They cannot avoid meeting because their jobs promote a single goal: protecting the organization's assets from intrusion.

An organization's data security officer and its internal DP auditor share many responsibilities. But each approaches his job from a different angle, depending on his organizational loyalties.

The security officer is trained to look at data security from a DP perspective. The officer looks for potential weaknesses in computer security and recommends technical measures to reduce any weaknesses he spots.

Because this position falls completely within the realm of data processing, the security officer is responsible to the MIS manager. In the same vein, his access is restricted to information that resides within this realm, as is his responsibility.

The auditor is trained to look at data security from a controls perspective. He looks for actual exposures in areas related to computer security and recommends controls to reduce any exposure he finds.

By nature of this charter, the auditor operates independently of the DP management structure; he reports to executive management — not to the MIS manager — and is authorized to gain access to any information, inside or outside of DP, to perform his job.

The courtship approach

At every point where the two can possibly come together, the MIS manager in charge should actively court their cooperation. This approach can breed impressive results, as the following scenarios demonstrate.

Case 1: Divided they fall. The data security officer and MIS manager of XYZ Corp. decide the company needs access control software to protect mainframe data from batch and on-line intrusion. They submit feasibility studies to executive management for approval. But XYZ's top managers feel leery of relying solely on the opinion of the MIS department. They do not find sufficient reason to approve the large expenditure, so they deny it.

Sobol is president of MIS Training Institute, Inc., a Framingham, Mass.-based firm that offers training and consultation services in the areas of security and auditing.

Case 2: United they stand. The same scene plays itself out at ABC, Inc. At this company, however, the data security officer and MIS manager elicit the support of the DP auditor, who harbors similar concerns about the risks of on-line and batch access.

The auditor stands behind the MIS manager's recommendation for installing access control software. ABC's top management — convinced of true need — approves the software acquisition.

Cooperation proves equally successful beyond the realm of software acquisition. In every sphere in which the auditor's and the security officer's responsibilities overlap — whether it be physical security, data security, risk assessment, contingency planning, systems development or production control — the auditor can be the MIS department's strongest ally.

> *The MIS manager should stay alert to see that the two security professionals agree on the assets to protect and the amount of resources to channel toward each type of protection.*

Physical security. Both the auditor and the security officer are concerned, from their separate perspectives, with controlling physical access to an organization's hardware assets — its mainframe as well as its minis and microcomputers. Likewise, they both monitor building construction and environmental controls and make sure the organization installs devices that will detect and contain smoke and fire.

If the officers combine their efforts, they can help each other sell top management on the need for improved physical security measures where appropriate.

Data security. In this realm, the security officer's and auditor's roles are more distinct; still, the roles complement each other.

The data security officer holds responsibility for specific measures: maintaining passwords, monitoring and reviewing security violations and protecting private or sensitive data.

The auditor's role remains more general. He controls and ensures the integrity of sensitive data, sees that the organization follows privacy regulations that govern corporate and employee data and makes sure all necessary access control mechanisms are in place.

The data processing manager, realizing how strongly these two roles depend on each other, should do what he can to encourage their mutual cooperation.

Risk assessment. This area needs little elaboration, as auditors and security officers commonly join forces to assess weaknesses in data and physical security.

The MIS manager should stay alert, though, to see that the two security professionals agree on the assets they want to protect and the amount of resources they want to channel toward each type of protection.

A good method for assuring agreement requires that the auditor and security manager sit down together when the time comes to develop a risk analysis model.

Contingency planning. The security officer usually holds complete responsibility for coordinating DP disaster recovery plans. The auditor, however, can also play an important role in the design, testing and maintenance of such plans.

During the testing of a disaster recovery plan, for example, the auditor can act as an impartial observer or umpire. The auditor, if involved, can offer an independent assessment of the overall success or failure of the test. The MIS department should accept the auditor's opinions as valuable guides toward future improvements.

Systems development. The security officer and the auditor share a great deal of responsibility for seeing that applications systems contain sufficient measures for security and control.

Both employees, for example, must review system specifications to uncover weaknesses. Both the security officer and auditor may also need to conduct system tests, monitor user training programs and review final applications along with their documentation.

Although the security and audit departments must work independently on each of these tasks, each should know of the other's findings. The MIS manager should do his best to keep lines of communication open.

Production control. In this area, the security officer holds the lion's share of responsibility. He must see that only properly designed, tested, documented and approved programs are added to the organization's production libraries. To do so, he must first establish the procedures that control the addition of new applications and the modification of existing ones.

The DP auditor should offer all the assistance he can when the security officer develops procedures. Afterward, he should conduct periodic reviews to check each procedure's effectiveness.

The MIS manager must stay receptive to the auditor's findings: Any weakness in control procedures can lead to unauthorized modifications that will render production data inaccurate. ■

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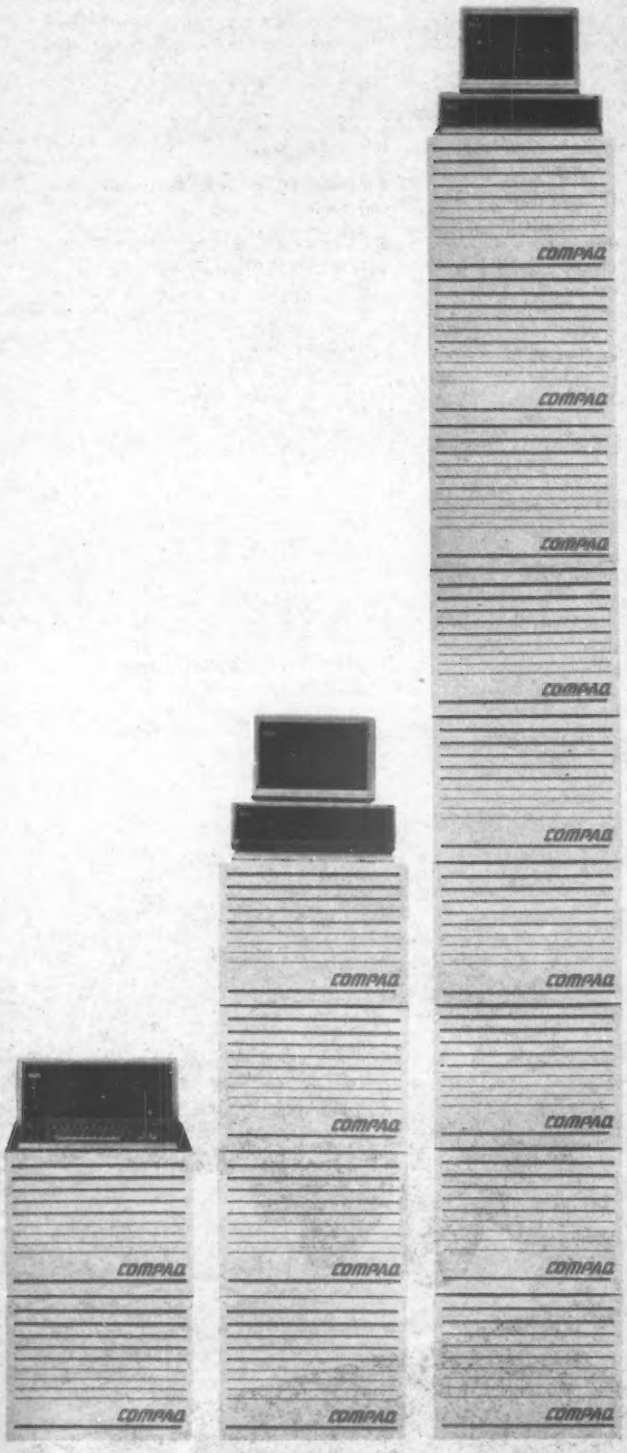
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NEW PRODUCTS

McDonnell Douglas adds minis to line

McDonnell Douglas Computer Systems Co. of Irvine, Calif., has added two minicomputer systems to its Microdata 9000 series product line, the M9250 and the M9050.

The M9250 is offered in a range of configurations.

The base system with 2M bytes of main memory, 260M bytes of disk storage, 32 ports and software is priced at approximately $200,000, according to McDonnell Douglas.

The top-of-the-line system with 6M bytes of main memory, 1,040M bytes of high-performance disk storage and 208 ports is priced at approximately $499,000.

The M9250 comes with software designed to enhance the Reality relational data base management operating system, the company said.

Security enhancements

The M9250 also incorporates security enhancements providing authorization locks to accounts, files and dictionary items. There are reportedly up to 10 different authorization levels.

Also included in the package is the company's fourth-generation application software generator All.

The second computer system, the M9050, is a real-time, transaction-oriented data base machine that supports a range of office automation tasks including spreadsheet, word processing and financial applications.

The M9050 base system, priced from $106,000, comes with 1M byte of main memory, 130M bytes of disk storage and eight ports.

The largest M9050 system, priced at about $360,000, offers 4M bytes of main memory, 104M bytes of disk storage and 128 open ports.

All application software currently available on the vendor's Reality-based systems is code compatible with the M9250 and the M9050 systems, McDonnell Douglas said.

Case's Grapevine net debuts

Links terminals, resources via existing phone wiring

Case Communications, Inc. of Silver Spring, Md., has introduced a local-area network for interconnecting terminal devices and computer resources within a building or site.

Called Grapevine, the system uses voice/data multiplexing techniques so that data traffic shares the existing telephone wiring without interfering with or interrupting normal speech usage.

The terminal can be a VDT, word processor or personal computer, the company said. An access unit is plugged into the telephone jack and both the terminal and the telephone handset plug into the access unit. Data rates up to 19.2K bit/sec. asynchronous or synchronous are available over the standard telephone wiring.

There is a central unit, adjacent to the private branch exchange, which filters out voice traffic and passes it to the PBX for normal switching. Data is routed to the appropriate computer or passed to a Case DCX switching exchange for dynamic routing. The DCX extends the local-area facilities of the system by providing access to multiple computers or ports grouped by applications, with built-in contention and queuing facilities. Protocol conversion gateway options can enable asynchronous terminals to access applications hosted in mainframe environments.



Grapevine uses voice/data multiplexing techniques with existing telephone wire.

Grapevine is priced at $500 per connection. Each connection has 32 channels.

DEC launches layered software Ethernet tool to monitor status

Digital Equipment Corp. of Maynard, Mass., has announced NMCC/VAX Ethernim, a network management software tool that reports the current, on-line status and condition of an entire Ethernet local-area network.

NMCC/VAX Ethernim runs as a layered software product on the VAX/VMS operating system, monitoring local-area networks by using the Ethernet protocol and Decnet Phase IV network software. It depicts the network graphically and maintains a historical reference file of events.

The monitor tests communications paths, gathers network information and creates a real-time graphics display of the entire local-area network. It can operate in any VAX environment that uses DEC's Duena Ethernet adapter, including the VAX 8600 environment, and it can monitor the simplest or the most complex local-area network configuration, even those with non-DEC nodes.

NMCC/VAX Ethernim reportedly has the ability to detect and alert local-area network managers to any changes and additions to the Ethernet configuration, including the addition of new nodes to the network. In addition to the diagnostic capabilities, NMCC/VAX Ethernim maintains a permanent, editable data base of information on each node on the local-area network.

A single-use license is priced at $7,000 except for the VAX 8600, for which the price is $10,500.

INSIDE

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IBM ups applications, data manager systems

Also introduces funds allocation software

IBM has announced enhanced versions of its Application System and its Data Facility Hierarchical Storage Manager Version 2 and has introduced the Funds Allocation System.

Application System Release 4 is an interactive application development facility that provides non-data processing trained professionals with commands and conversational facilities for solving business problems.

The enhancements include MVS/SP Version 2 — 31-bit addressing — exploitation, Database 2 support in MVS environments, migration aid to assist in the transfer of Application System programs and data from VM to MVS, transportable files, batch mode operation in MVS environments, enhanced data base maintenance facilities, Interactive System Productivity Facility communication function, business tool enhancements and customization options to reduce size of shared segment.

Application System Release 4 will be available in April 1986. It can be licensed for an initial license charge and monthly license charges or for a one-time charge. The initial license charge is $53,500. The monthly charge ranges from $1,700 for 15 concurrently signed-on terminal users to $9,950 for unlimited MVS signed-on users. The one-time charge ranges from $101,500 for 15 concurrently signed-on users to $350,000 for unlimited MVS users.

Data Facility Hierarchical Storage Manager Version 2 Release 2 offers enhanced 3480 Magnetic Tape Subsystem performance via a single-file data format option and use of the 3480 high-speed search feature. It operates with MVS/XA and MVS/370.

Release 2 is available now. The basic license costs $800, and the distributed site license option is $600.

The Funds Allocation System allows users to simulate the effect of current and future investment decisions. It uses parameters unique to the user's institution to provide guidelines for optimal asset allocation and funding policy.

The Funds Allocation System runs on VM/CMS; PL/I Transient Library and MPSX/370 must be installed.

It is available for a one-time charge of $27,000.

Emulation software out

Burroughs Corp. of Detroit, Mich., has announced a Diebold Corp. emulation software package for its RT 750 Customer Activated Delivery System.

The emulation software reportedly enables RT 750s to communicate with mainframe computer systems in the same format as Diebold's Model 910 and Model 911 Automated Teller Machines. The software translates messages sent to an RT 750 in Diebold format into Burroughs format, and vice versa.

The Diebold emulation software package is provided free with any purchase of an RT 750, Burroughs said. The RT 750 prices start at $18,600.

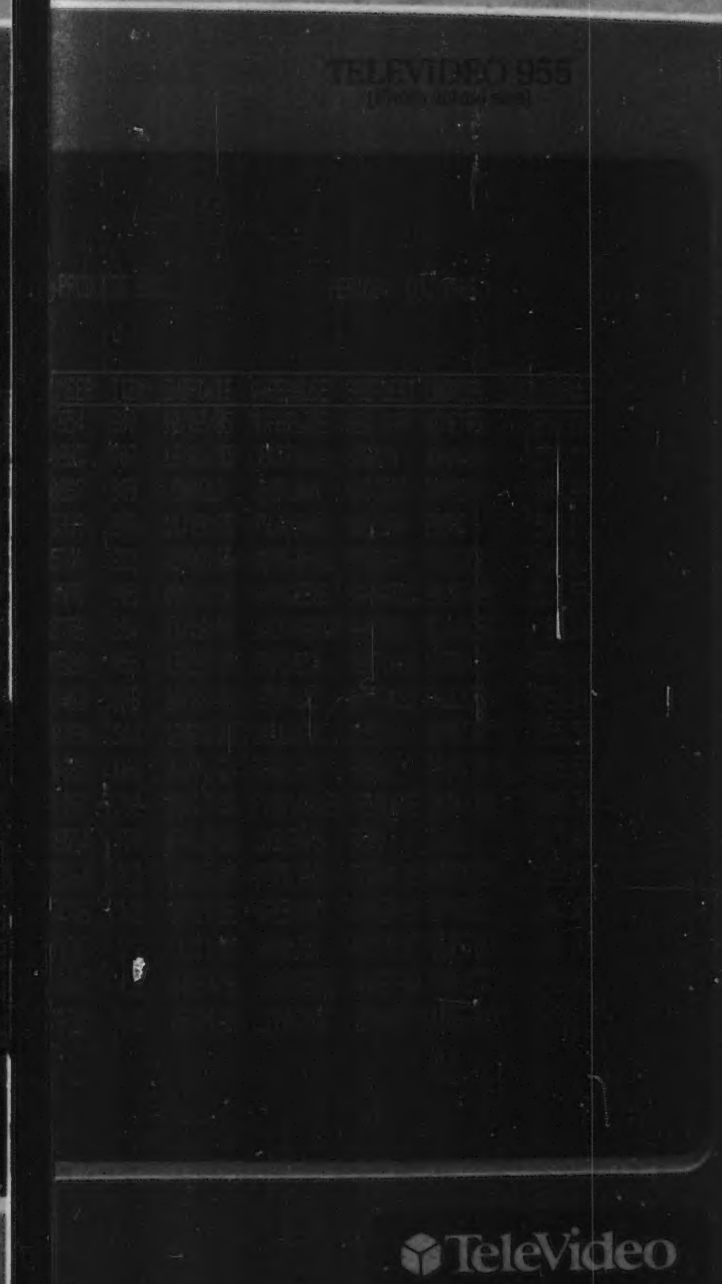
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SOFTWARE & SERVICES

Systems software

Software International Corp. has announced a new version of its **General Ledger & Financial Reporting System** for the Sperry Corp. 1100 computer.

The version allows on-line inquiry by posting-level account into the transactions in the month-to-date and history files.

There are also description look-up capabilities, the ability to transfer entire structures and mass-deletion capabilities.

The product is available for a license fee ranging from $85,000 to $95,000.

Software International, One Tech Drive, Andover, Mass. 01810.

■

Al Lee & Associates, Inc. has announced an optional **Color 3270** support feature for its on-line application development system Magec.

The new feature supports the extended color and highlighting capabilities of the IBM and compatible 3270-type terminals with seven-color support. It allows applications developers to generate systems that manipulate field-level controls of the seven defined colors and three extended highlighting attributes.

Magec costs $88,000 for IMS, $72,000 for OS/CICS, $32,000 for DOS/CICS or Datacom DC and $28,000 for Westi environments. The Color 3270 feature costs $5,000 for OS and $3,500 for DOS.

Al Lee & Associates, 2324 Seedling Lane, Dallas, Texas 75252.

■

Infocraft, Inc. has introduced the **POS/3000**, a point-of-sale automated polling system designed for the Hewlett-Packard Co. HP 3000.

The POS/3000 provides communications between remote and local point-of-sale terminals and the HP 3000. It can handle up to 1,000 stores with an unlimited number of terminals in each store. It uses the standard HP 3000 bisynchronous communications facilities to talk to the point-of-sale terminals that communicate with an IBM mainframe using 2780 or 3780 protocols.

POS/3000 costs $12,000.

Infocraft, Suite 107, 15614 Hawthorne Blvd., Lawndale, Calif. 90260.

■

Control Data Corp. has added the **ICEM Configuration Manager (ICEM CM)**, an on-line, real-time information system for controlling product life cycles to its ICEM system of integrated software and hardware for computer-aided design and manufacturing functions.

ICEM CM automatically collects, coordinates, formats, stores, updates and distributes product and project data, including design changes.

ICEM CM operates on a Control Data Cyber 830 or larger system. A complete system, including hardware, software, consulting and CAD/CAM applications, is priced starting at approximately $1 million. ICEM CM software only is priced at about $300,000.

Control Data, 8100 34th Ave. S., Minneapolis, Minn. 55440.

■

GMD Systems International, Inc. has announced **34/36 Jobqueues**, a batch throughput system for users of the IBM System/34 and 36.

The product allows increased batch throughput performance. It offers security provisions and performance monitoring. It features a global search-and-replace feature; preservation of external program switches and substitution parameters; and reports on the IBM JOBQ contents, security, job conflict and performance test statistics.

The product costs $1,000.

GMD Systems, 8601 Dunwoody Place, Atlanta, Ga. 30338.

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NEW PRODUCTS/SOFTWARE & SERVICES

Advanced Systems Concepts, Inc. has announced **Command Source** retrieval, a software product said to retrieve command definition source statements from any command object.

Command Source was designed for the IBM System/38. Each process examines resident System/38 object code and manipulates it in order to retrieve the original source code. Once command source has been retrieved, it can be changed and the command re-created.

Command Source is available for a one-time license fee of $500.

Advanced Systems Concepts, Suite S, 1350 Remington Road, Schaumburg, Ill. 60195.

■

Control Data Corp. has announced its **Eden** student records system.

Eden supports student-related administrative functions like admissions, registration and grades, financial aid processing and student accounts receivable.

The system can be modified to adapt to a school's policies and procedures. It runs on CDC's Cyber 180 computer series, ranging from the entry-level Model 810 to the high-end Model 990.

Eden is priced from $150,000 to $200,000.

CDC, 8100 34th Ave. S., Minneapolis, Minn. 55440.

Epix application development software that allows users to create and alter data collection programs was unwrapped by **Epic Data.**

Epix lets users develop programs on the Digital Equipment Corp. VAX-11/750 or the IBM Personal Computer. The programs are uploaded to the vendor's Host Programmable Control Unit or Host Programmable Portable Terminal for implementation.

The software includes an interactive editor, compiler and program transfer function for downloading data.

Epix requires a C compiler with AT&T Unix V7 compatibility library and 128K bytes of memory. The package, including an IBM Personal Computer distribution disk or tape for the VAX-11/750, sells for $6,800.

Epic Data, 7280 River Road, Richmond, B.C. V6X 1X5 Canada.

Productivity aids

Eagle Software, Inc. has added the **Manager** utility to its VS Toolbox for Data General Corp.'s AOS/VS operating system.

The Manager enables space management on Infos II indexes and data bases that have disabled space management without having to rebuild the file.

Companies that have already purchased the VS Toolbox will receive the Manager free of charge. The VS Toolbox is priced at $1,850.

Eagle Software, P.O. Box 16, Salina, Kan. 67402.

■

Relational Data Base Services, Inc. has announced a **data base tuning service** for users of Software House, Inc.'s System 1032 data base management system for Digital Equipment Corp.'s VAX computers.

A consultant will review data base descriptors provided by the user for data type inconsistencies. The consultant will review the programs and data management control for use of current efficiency techniques, structured programming and possible program design improvements.

The consultant will provide a written analysis and recommendation for each data management descriptor and control.

The costs for this service are $250 per data management descriptor file and $100 per page per data management control file.

Relational Data Base Services, P.O. Box 644, 121 S. Main St., Kernersville, N.C. 27285.



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Application packages

Trax Softworks, Inc. has ported its **ESS** three-dimensional mainframe electronic spreadsheet software to Applied Data Research, Inc.'s ADR/Roscoe.

ESS generates 3-D spreadsheets of unlimited size and communicates with micro spreadsheets to bring peripheral information into the corporate data base.

The annual license for ESS is $2,400.

Trax Softworks, 10801 National Blvd., Los Angeles, Calif. 90064.

■

Lawson Associates, Inc. has added the **Employee Expense** module to its Pinstripe Accounts Payable package.

The Employee Expense module was designed for Burroughs Corp. and for IBM System/38 users. It allows users to match employee expenses with advances, track expense reports and advances, create statements for employee records and keep employee expense checks separate from vendor checks.

The System/38 Employee Expense module costs $4,000. The Burroughs module is priced between $3,000 and $5,000.

Lawson Associates, 2021 E. Hennepin Ave., Minneapolis, Minn. 55413.

Data base management systems

Sperry Corp. has introduced the **Suprema** system, an on-line maintenance management system designed for use with Sperry 1100 series computers and the Sperry System 11 mainframe.

Suprema is an interactive data base system that can be used to generate and track work orders, work order planning, preventive maintenance tasks, equipment history, spare parts inventory levels and resource requirements as well as a catalog of plant equipment.

Suprema is priced at $68,000 for the System 11, $85,000 for the 1100/60 and 1100/70 systems and $93,500 with the 1100/80 and 1100/90 systems.

Sperry, P.O. Box 500, Blue Bell, Pa. 19424.

Languages

Infotek Systems has announced the **BC 204 Basic Compiler** for the Hewlett-Packard Co. Basic Version 4.

The BC 204 is compatible with the HP 9000 Series 200/300 Technical Workstations. Compiled programs operate directly with Infotek's FP 200 or FP 210 floating-point coprocessors as well as the HP 98635 floating-point coprocessor.

The compiler costs $880.

Infotek, 100 N. Baxter St., Anaheim, Calif. 92806.

MICROS

Software

Black Sheep Software has introduced a Microsoft Corp. MS-DOS and IBM PC-DOS utility program called **Comsaver**.

Comsaver prevents MS-DOS and PC-DOS application programs from overwriting the transient part of COMMAND.COM and eliminates the need for MS-DOS and PC-DOS to reload COMMAND.COM.

Comsaver costs $19.95.

Black Sheep Software, P.O. Box 1017, Venice, Calif. 90294.

■

Modern Technologies International, Inc. has announced the **Modtech Retail Management System** (RMS) designed for independent retailers using IBM PC-DOS- or Microsoft Corp. MS-DOS-based IBM-compatible personal computers or AT&T Unix-based multiuser systems.

The system is configured to support all transactions entered at the point of sale. Functions performed include the management of sales by register, login of checkers, manual transaction override, weighed items, multiple items, special offers and price lookup. The system will maintain a status of inventory. A customer data base is also provided, as well as a set of management reports.

RMS prices start at $4,995.

Modern Technologies International, Suite 200, 535 Middlefield Road, Menlo Park, Calif. 94025.

■

Everett Enterprises has released **The Private Line**, an encryption utility for IBM's PC-DOS, Microsoft Corp.'s MS-DOS and Digital Research, Inc.'s CP/M.

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VERIFY, our newest productivity aid, provides automated quality assurance testing for CICS applications. VERIFY significantly reduces the time and personnel required for comprehensive testing, because you only have to enter the test data once. If you have a DOS/VSE or MVS operating system with CICS Release 1.5 or above, you're ready for VERIFY.

InterTest is an On-Line Software classic, the industry standard for CICS application testing and debugging. Over 1600 users benefit from an average productivity gain of 46%* with InterTest, which combines powerful features with ease of use. CICS systems are more stable, while testing and debugging are faster, easier, and more effective with InterTest.

DataVantage simplifies DL/1 testing and development for users of IBM and DOS/DL1 data bases. DataVantage creates reliable test data bases that check logic thoroughly, even for data bases with complex relationships. Restructuring as well as comparing data bases is streamlined with DataVantage.

Here's how other companies strategically use VERIFY, InterTest, and DataVantage to increase productivity.

VERIFY

Northern Natural Gas: Maintaining software quality while saving time.

"New applications development methodologies and hardware make it increasingly difficult to maintain quality. That's why we need VERIFY." So says John Latenser, Senior Systems Analyst at Northern Natural Gas, a leader in the transportation of natural gas products. VERIFY helps the Omaha company develop more reliable systems faster. "With VERIFY, we reduce our testing time by 25 to 50 percent," he said. "That gives us a definite competitive edge."

"I think it's fortunate that On-Line Software International came out with VERIFY, because it is the solution we had been looking for," Latenser continued. By way of an example, he cited an on-line system that required five successive revisions. "From the documentation standpoint alone, VERIFY shaved a whole day off the revision process. Quality and reliability were enhanced," he said.

InterTest

ADT Security Systems: User-friendly testing produces more accurate systems.

Programmer productivity goes up appreciably with InterTest, according to Kathleen Wolfson, Senior Systems Analyst at ADT Security Systems, New York. "We get systems out quicker than we would have otherwise," she stated. "They're much more

Our software programs are exclusively marketed throughout continental Europe by ITT affiliates. For information call: Austria (0222) 7226870 Belgium (02) 3701811 France (01) 5456705. Germany (0711) 880-2760, Holland (070) 906282, Italy (06) 912881, Norway (02) 638800, Spain (91) 7540200, Sweden (08) 7360150 On-Line Software's office Brussels, Belgium 32-2-640-1436. In the UK call (01) 950 3576.

The Private Line encrypts program or data files in accordance with the Data Encryption Standard. It uses either one or two 64-bit keys.

The PC-DOS or MS-DOS version allows users to create, change and remove directories. Both versions will display, print and purge files. Encrypted data may be converted to ASCII for use over telecommunication systems.

The Private Line is priced at $49.95 for the PC-DOS or MS-DOS version and $29.95 for the CP/M version.

Everett Enterprises, P.O. Box 193, Bath, N.C. 27808.

■

Microphonics Technology Corp. has introduced Version 1.2 of **Pronounce**, its speech input system for IBM Personal Computers and compatibles.

Enhancements include the addition of a set-level utility, faster loading of vocabularies, the capability to password-protect user vocabularies and the ability to change vocabularies through voice control.

Pronounce 1.2 consists of a Personal Computer board, software with predefined vocabularies for Micropro International Corp.'s Wordstar and Lotus Development Corp.'s 1-2-3, a microphone and a user manual. It requires 256K bytes of memory.

Pronounce 1.2 is priced at $695.

Microphonics Technology, Suite B, 234 S.W. 43rd St., Renton, Wash. 98055.

Systems

Digital Equipment Corp. has announced its **Interactive Video Information System (IVIS) 2000**, a version of its multimedia workstation.

The IVIS 2000 is based on the Professional 380 personal computing workstation. The system is offered in eight languages. It has three open slots, so it can be expanded with hardware options like the Decnet-Ethernet local-area network interface and a four serial-line option.

IVIS integrates still photographs and full-motion natural video on a high-resolution display with computer-generated graphics, text and sterophonic soundtracks.

IVIS 2000 is priced at $10,000 for a standard system and $11,100 for the Dectouch IVIS system.

DEC, Maynard, Mass. 01754.

■

Omnicomp Graphics Corp. has announced **Totalcad**, a full-function, general-purpose, two-dimensional computer-aided design and drafting (CADD) system.

Totalcad was designed to distribute different tasks within a CADD system across multiple microprocessors. It uses an IBM Personal Computer or compatible system for main program execution, data management and retrieval. The graphics display controller, Omnicomp's Omni 1000 GDC, performs all graphics commands.

Totalcad costs $12,300.

Omnicorp Graphics, 1734 W. Belt North, Houston, Texas 77043.

■

Datapoint Corp. has unveiled **Starport**, a multiuser data processing system.

Compatible with the IBM Personal Computer AT, Starport supports up to 17 users and will operate in attached resource computer local-area networks.

The vendor's PC8220 software connects Starport to Datapoint host systems running under IBM PC-DOS or RMS. Starport users can access Microsoft Corp. MS-DOS and GW-Basic and user system diagnostics.

A basic Starport system consists of a 16-bit Intel Corp. 80286 processor with 512K bytes of memory, 14-in. monochrome monitor, detached keyboard with 30 function keys, one 1.2M-byte disk and 20M bytes of fixed-disk storage.

The basic system costs $5,995.

Datapoint, 9725 Datapoint Drive, San Antonio, Texas 78284.

Communications

Systems Software and Development, Inc. has announced **Teleplan**, a traffic engineering tool designed for the IBM family of personal computers.

Teleplan allows users to determine grade of service, the minimum trunks needed for a grade of service, calls offered and calls lost, least-

Continued on page 70

I T Y A I D S

MIS DP SOFTWARE STRATEGIES

thoroughly tested, and much more accurate, which is very important to me."

"If ever there was a package that was user-friendly, InterTest has got to be the best at that," Wolfson continued. "The biggest benefit to us is, you can have people who are not the world's greatest experts learn from their mistakes, and they'll be able to turn something around very quickly."

"There are other testing packages, but InterTest is one of the few packages on the market that I just can't imagine running a CICS shop without," she observed.

DataVantage
GTE Communication Systems: Easy testing of complex IMS recursive relationships.

GTE's first use of DataVantage was at its North Lake, Illinois facility for manufacturing large central office switching systems. "This was a particularly demanding application because of the IMS recursive relationships involved," Senior Data Base Analyst Brian Bowers explained. "DataVantage has proved to be a most valuable data base subset management tool for us."

Running an IBM 3084™ under IMS, GTE Communication Systems uses DataVantage to generate accurate subsets of data bases. "We have found it to be a completely functional tool that is also easy to use," he said.

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To help you develop your own corporate strategy for programmer productivity, On-Line Software has scheduled a series of free half-day seminars on VERIFY, InterTest, and DataVantage. Choose from the seminar locations listed below and call us, toll-free, for exact dates and times.

January 6-7, 1986 - New York, NY
January 20-21, 1986 - San Francisco, CA
January 22-24, 1986 - Los Angeles,, CA
February 4-6, 1986 - Fort Lee, NJ
March 4-5, 1986 - Philadelphia, PA
March 25-26, 1986 - Chicago, IL
April 2-4, 1986 - Fort Lee, NJ
April 8-9, 1986 - Toronto, ONT

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On-Line Software International, Inc.

IBM® Software Authorities

*From an audited survey of all InterTest users conducted by Ernst & Whinney.
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Continued from page 69

cost planning analysis with or without overflow facilities, queueing performance, number of servers needed for varying conditions and data communications queue and line performance.

Teleplan calculates results directly and can handle traffic intensities up to 2,500 Erlangs. It accommodates up to 5,000 lines.

Teleplan is priced at $195.

Systems Software and Development, Suite 302, 7633 E. 63rd Place, Tulsa, Okla. 74133.

■

Anchor Automation, Inc. has introduced the **Signalman Expressi** board-level modem for the IBM family of personal computers as well as the **Volks Mini** modem.

The Expressi is asynchronous and operates at 300 or 1,200 bit/sec. It features autodial and autoanswer capabilities as well as redial and hangup. It is Hayes Microcomputer Products, Inc. compatible and comes bundled with Lync communications software from Norton-Lambert, Inc.

Volks Mini also provides 300 or 1,200 bit/sec. data transmission. It connects to any computer or terminal through an RS-232C interface and to any Touch-Tone telephone via an RJ11 interface. It is AT&T 212A compatible and offers asynchronous full-duplex, direct-connect transmission.

Signalman Expressi is priced at $299. Volks Mini is priced at $199.

Anchor Automation, 6913 Valjean Ave., Van Nuys, Calif. 91406.

■

Pacer Software, Inc. has announced **PClink**, a package that integrates Digital Equipment Corp. VAX minicomputers with the IBM Personal Computers and the Apple Computer, Inc. Macintosh.

For running VAX applications, PClink includes high-speed DEC VT100, VT220 and Televideo Systems, Inc. 950 terminal emulation on the microcomputers.

Only the host side of PClink is licensed. Prices range from $2,000 for five personal computers to $15,000 for an unlimited number of personal computers on a single host.

Pacer Software, Suite 320, 100 Pennsylvania Ave., Framingham, Mass. 01701.

Storage

CMS, Inc. has unveiled the **Power series**, a family of external mass-storage subsystems for IBM Personal Computer compatibles.

There are four basic configurations. The Power Twin combines both tape and hard disk drives in one unit. The hard disk is available in 10M-, 20M- and 30M-byte capacities with a 10M- to 60M-byte tape drive.

The Power Tape subsystem features one full-height cartridge tape drive available in 45M- or 60M-byte capacities. The Power Drive subsystem offers additional hard-disk storage without tape backup and is available in 20M-, 30M-, 42M-, 70M- and 120M-byte capacities.

The Power Center subsystem, fully loaded, includes a half-height 60M-byte tape drive and a half-height 10M-, 20M- or 30M-byte hard disk drive.

Prices for the Power Twin and Power Center range from $1,989 to $3,389. Power Tape prices range from $1,694 to $1,794. Power Drive prices range from $1,594 to $7,094.

CMS, 401-B W. Dyer Road, Santa Ana, Calif. 92707.

■

Portable Solutions, Inc. has announced the **BP-25+** portable tape backup system for IBM Personal Computer, Personal Computer XT, AT and compatibles with IBM PC-DOS or Microsoft Corp. MS-DOS 2 or higher.

It can back up more than 25M bytes per cassette at 5M byte/min. The BP-25+ comes with Survival software, a collection of utilities for simplified backup and restore.

BP-25+ is priced at $1,295.

Portable Solutions, Suite 250, 1701 Directors Blvd., Austin, Texas 78744.

Reference Technology, Inc. has introduced the **Reference Technology Clasix Series 500 CD-ROM Datadrive**, a software library of more than 8,800 IBM Personal Computer programs on a single compact disk read-only memory (CD-ROM) unit.

The library includes a selection of word processors, editors, data base management systems, spreadsheets, financial and business applications, communications programs, math/statistical packages, programming languages, graphics packages and games.

The Reference Technology Clasix Series 500 CD-ROM Datadrive costs $1,595, including the Clasix Software Library Dataplate, an IBM Personal Computer interface card and cable.

Reference Technology, 1832 N. 55th St., Boulder, Colo. 80301.

Portable Solutions, Inc. has introduced the **Backpac BP-100+** optical storage system for the IBM Personal Computer, Personal Computer XT, AT and compatibles running Microsoft Corp. MS-DOS 2 or higher.

The BP-100+ is a portable system that uses laser technology for one-time writing and repetitive reading. It comes equipped with three 100M-byte optical disks, ready for use with up to three personal computers.

The unit can be expanded to function with more than three personal computers by adding one I/O extender card per personal computer.

The Backpac BP-100+ is priced at $4,995 including a collection of software utilities for simplified backup and restore operations. Additional extender cards cost $99 each.

Portable Solutions, Suite 250, 1701 Directors Blvd., Austin, Texas 78744.

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ROLM has new technology you can grow with, phone bills you can live with.

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It can shop dozens of competing long distance services.

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You're not limited to just one carrier. There are no equal access penalty charges or delays for changing services. And because CBX II watchdogs every call—like the zillions of per-

4900 Old Ironsides Drive, M/S 626, Santa Clara, CA 95054

NEW PRODUCTS/MICROCOMPUTERS

Digital Equipment Corp. has added to its library of data bases on compact disk read-only memory disks, bringing the total to 10.

The data base disks include the company's Microbasis search and retrieval software for either DEC MicroVMS or Microsoft Corp. MS-DOS.

The new titles include Chemical Engineering from the Computerized Engineering Index by Engineering Information, Inc.; Medicine, Health Care and Biology and Aeronautics, Aerospace and Astronomy, by the National Technical Information Service; Current Biotechnology Abstracts by the Royal Society of Chemistry and The Fine Chemicals Directory by Fraser Williams Scientific Systems, Ltd.

Prices range from $995 to $1,395.

DEC, 146 Main St., Maynard, Mass. 01754.

Printers/Plotters Peripherals

Datatek Corp. has introduced an IBM Personal Computer version of its **Datatimes** optical disk library system for newspaper and magazine publishers.

Publishers can attach the digital reader to the personal computer and have unlimited disk access to more than two years of information. The optical disk system eliminates on-line charges and linkup difficulties.

The system runs on Basis software from Battelle Pacific Northwest Laboratories and allows disk mastering on Microsoft Corp. MS-DOS-based personal computers.

The optical disk library system is priced at $2,190.

Datatek, 818 N.W. 63rd St., Oklahoma City, Okla. 73116.

Tektronix, Inc. has unwrapped the **LCS Color Graphtext System** for the IBM family of Personal Computers.

It lets users display color graphics and text with 640-pixel by 400-line resolution. The system includes the Tek LCS 1220 color graphics display, a 12-in. LCD shutter display and the Tek LCS E480 emulator card.

The LCS Color Graphtext System costs $1,575.

Tektronix, P.O. Box 500, M/S 46-556, Beaverton, Ore. 97077.

Board-level devices

CMS, Inc. has introduced **Rambo**, a multifunction board for the IBM Personal Computer AT, and the **CMS 4X4**, a four-function, half-size add-in board for the entire IBM family of Personal Computers.

Rambo includes a serial port, parallel port, game port and up to 1.5M bytes of dynamic random-access memory (RAM). CMS 4X4 includes a serial communications port, a parallel port, game port and clock/calendar.

Rambo is priced at $495 with the minimum 128K bytes of RAM. CMS 4X4 is priced at $195.

CMS, 401-B W. Dyer Road, Santa Ana, Calif. 92707.

■

Genoa Systems Corp. has introduced five products for the IBM family of Personal Computers: **Spectrum Plus, Capture, Stretch AT/XT**, the **Novacom** modem and **Spectra-EGA.**

Spectrum Plus is a graphics card featuring an RS-232C serial port, a clock/calendar, 132-col. capability and 16 colors or shades.

Capture is an image digitizer board. It captures images via a standard RS-170 video input.

Stretch AT/XT is a multifunction board available in two versions: one for the Personal Comptuer XT with memory expansion up to 384K bytes and one for the AT with memory expansion up to 3M bytes.

Two versions of the Novacom modem are available: the Novacom 1200 supporting 300 and 1,200 bit/sec. transmission rates and the Novacom 2400 supporting 300, 1,200 and 2,400 bit/sec. transmission rates.

The Spectra-EGA is an enhanced graphics adapter card that supports the enhanced IBM graphics mode and products.

Spectrum Plus is priced at $495. Capture is priced at $1,495. Stretch AT/XT for the Personal Computer XT is priced at $299, and for the AT with 0.5M byte of memory it is $599. The Novacom 1200 and 2400 internal models are priced at $339 and $629, respectively, and external models are $359 and $649, respectively. Spectra-EGA is priced at $495.

Genoa Systems, 73 E. Trimble Road, San Jose, Calif. 95131.

■

Bay Computer Corp. has announced that the **PC/Audit** expansion card for the IBM Personal Computer and Personal Computer XT is now available for the IBM AT.

The PC/Audit card allows the personal computer to allocate time usage of the system to one of 256 different accounts, to limit access to the equipment during certain hours and to provide an audit trail of computer usage for job costing or allocating expenses. The audit trail can be used alone or read into Lotus Development Corp. 1-2-3 for further analysis.

The PC/Audit card is priced at $239.

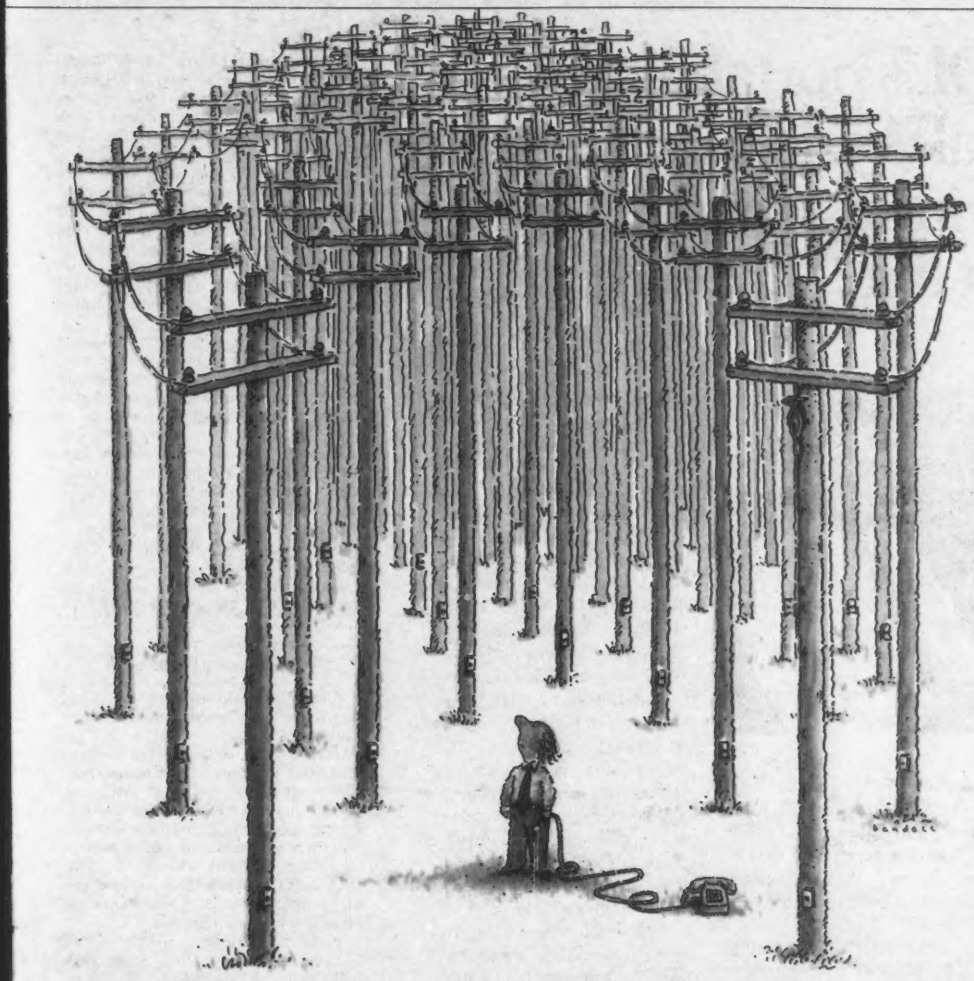
Bay Computer, York & Haverhill St., Andover, Mass. 01810.

■

Iomega Corp. has introduced the **PC2B adapter card**, which enables IBM Personal Computer, Personal Computer XT and AT users with Bernoulli box subsystems to load a microcomputer's operating system directly when the personal computer is turned on.

The PC2B supports enhanced IBM PC-DOS commands, includes menu-driven utilities and offers enhanced backup and restore capabilities.

Continued on page 72



sonal calls that can squash the company kitty—you can keep track of bills and chargebacks. Call us.

We'll break down your current phone bills. We'll recommend the stingiest carriers. (After all, we built our name managing call costs.) We'll dazzle you with the power of CBX II, the wizardry of advanced routing, the thrill of nationwide service and support.

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Let's talk. Remember, you're not out of the woods, yet.

ROLM
an IBM company

800-538-8154. (In Alaska, California and Hawaii, call 408-986-3025.)

Continued from page 71

The PC2B costs $255; a PC2B upgrade kit for the PC2 card costs $110.

Iomega, 1821 W. 4000 South, Roy, Utah 84067.

■

Compressit, an IBM Personal Computer, Personal Computer XT and AT add-on board that reduces the space needed to store bit-mapped images has bowed from **Chorus Data Systems, Inc.**

The Compressit board removes redundant information and encodes the data. It requires a single slot in the expansion bus.

The Compressit add-on board is priced at $995.

Chorus Data Systems, P.O. Box 370, 6 Continental Blvd., Merrimack, N.H. 03054.

The **AMI PC-AT Multi-User board** for connecting up to eight serial devices to IBM Personal Computer XTs, ATs and compatibles is offered by **American Micronics, Inc.** (AMI).

The board consists of a bus interface, address decode, interrupt timing and decode, eight RS-232 serial ports and standard COM 1 and COM 2 support. It supports all control lines necessary to drive most asynchronous terminals, printers and modems.

Prices are $375 for four-user and $575 for eight-user models.

AMI, Suite H, 17811 Skypark Circle, Irvine, Calif. 92714.

■

The **COM-232/COM-422**, an add-on board that enables serial data I/O through an additional resident port or COM1/COM2 serial ports with no communications programming, has bowed from **Aedex Corp.**

It permits serial I/O from compiled applications or commercial packages such as Ashton-Tate's Dbase II and Lotus Development Corp. 1-2-3.

Users can send and receive data through up to three serial ports on an IBM Personal Computer, Personal Computer XT, AT and compatibles.

The board and firmware list for $450.

Aedex , Suite C, 181 West Orangethorpe, Placentia, Calif. 92670.

Auxiliary equipment

Inmac Corp. has introduced the **Keypatch**, a product that locks the IBM Personal Computer keyboard in Num-Lock and transfers cursor functions to itself.

Keypatch rids errors and wasted time caused by switching between functions. It plugs into the keyboard cable and needs no software.

The Keypatch is priced at $84.95.

Inmac, 2465 Augustine Drive, Santa Clara, Calif. 95054.

■

Computer Products, Inc. has introduced the **Micro-40 series** of offline switching power supplies.

The series features single output models of 5, 12, 15 and 24 Vdc. All models feature an on-board input filter, input fuse and input voltage select. All outputs are overload protected.

In quantities of 100 it costs $75.04.

Computer Products, 2220 Lundy Ave., San Jose, Calif. 95131.

■

Data General Corp. has enhanced its **On-line Information Service** (OIS), which provides videotex information and support for users of Data General Desktop Generation and Data General/One systems.

The new OIS uses the Compuserve network and features a simplified menu listing separate data bases for the two systems. Users may access OIS via a variety of local telephone numbers including McDonnell Douglas Network Systems, Inc.'s Tymnet and GTE Telenet Communications Corp.'s Telenet.

OIS offers regularly updated downline load software patches; techniques for applications; pricing information; DG Talk, a user bulletin board; and technical information.

OIS usage is based on an hourly fee schedule. Introduction Menu is free of charge; General Information costs $25; Support Information costs $35; and Maintenance Information costs $45.

DG, 4400 Computer Drive, Westboro, Mass. 01580.

COMMUNICATIONS

Multiplexers/modems

Communications Plus, Inc. has announced its **Firecom** modem accelerator.

Firecom is used on remote synchronous modems allowing users of IBM's Systems Network Architecture/Synchronous Data Link Control protocol to reduce the data streams and increase the number of terminals on a link. It works with 2,400, 4.8K or 9.6K bit/sec. synchronous modems on a point-to-point, multipoint or switched communications.

Firecom is priced at $975.

Communications Plus, Suite 250, 3300 Holcomb Bridge Road, Norcross, Ga. 30092.

■

Codex Corp. has announced the **Codex 2122**, a synchronous, limited-distance service unit for point-to-point, multipoint and tail circuit applications.

The 2122 supports four-wire, full or half-duplex and two-wire half-duplex configurations. It operates at user-selectable rates of 40K, 48K, 56K and 64K bit/sec. Other features include an automatic equalizer that compensates for circuit distortion

Continued on page 74

"RM/COBOL's portability has allowed RealWorld to address the micro accounting market with one product line."

David Gale,
Founder and CEO of RealWorld Corp.,
on the advantages of RM/COBOL.



There are two ways to develop software.

One is to have a separate development effort for every different machine on the market. Which becomes geometrically more painful with every new machine.

The other is to do what David Gale and a host of other smart software developers are doing.

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With RM/COBOL,™ you write your application once. And let our runtime software take care of running it on over 200 different micros, including the IBM® family of PCs.

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Now, you'd think using the runtime software you'd sacrifice some speed. In fact, the resulting code is so elegant, so compact, your applications will actually run *faster* than if you had used the PC COBOL you may be using now.

As for supporting enhancements later on, our machine-independent approach lets you make a one-time change in the source code and our runtimes do the rest. So not only do your applications run like the wind, your development effort does, too. And no matter which way the wind blows, you'll still have broad-based market potential.

Even LANs, like IBM's PC™ Network, Netware,™ l0-Net,™ and ViaNet™ are covered because RM/COBOL is available for them, too. As well as for UNIX,™ Xenix,™ and other popular multiuser operating systems.

What's more, there's a free directory of programming tools, like code generators, report writers, and screen formatters. Along with listings of more than 1500 general business and vertical applications from important companies like RealWorld.™ It's the most extensive of its kind and it's yours for the asking.

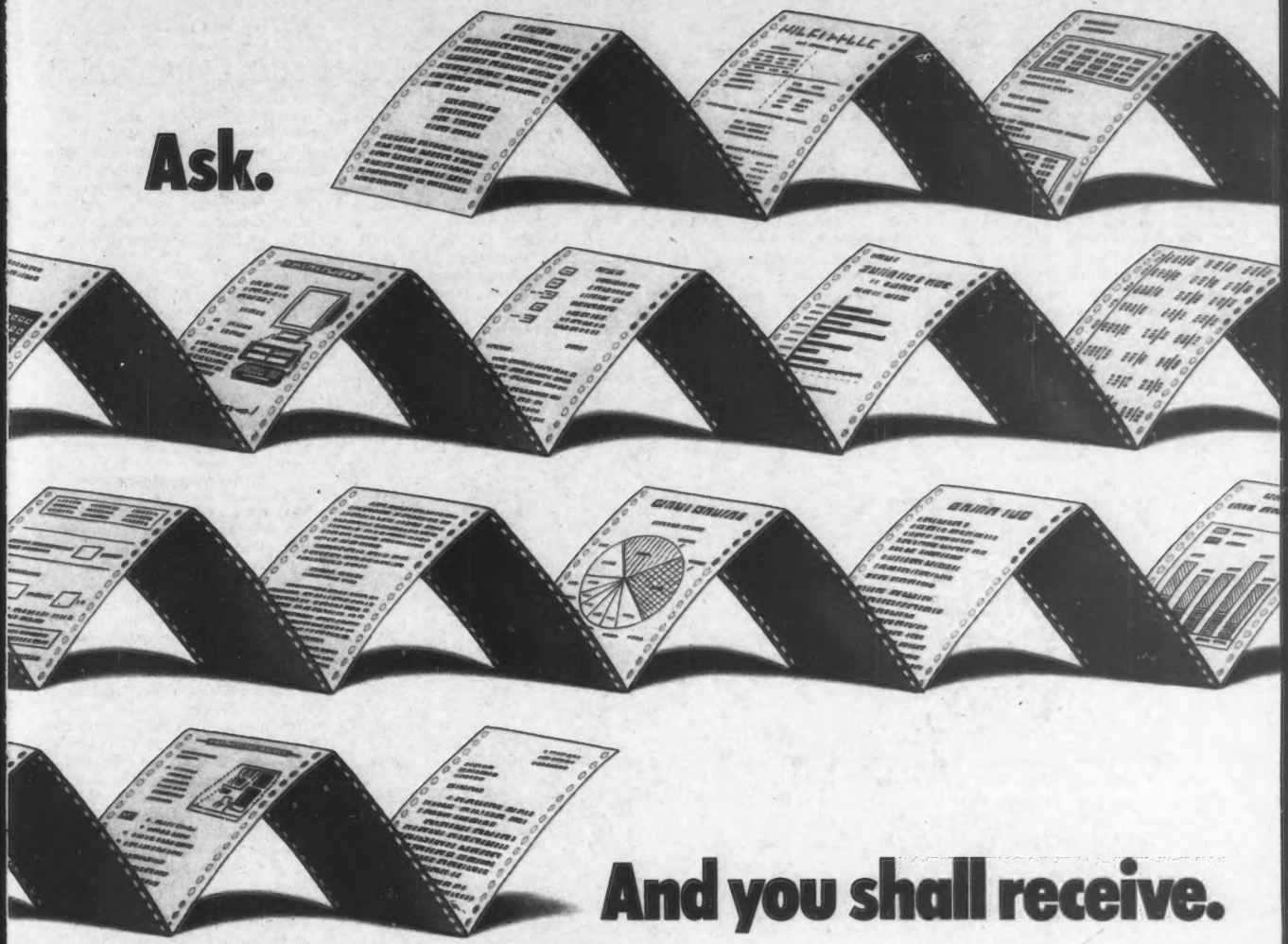
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Ask.



And you shall receive.

What do you do when you're preparing a report in the Philadelphia office and the Los Angeles office has all the information?

Walk over to your AT&T 5300 Teleprinter and use its keyboard to access the data. Moments later, crisp copy and vivid graphics arrive through your printing terminal.

Teleprinting isn't all you receive.

If all the AT&T 5300 Teleprinter did was teleprint, that alone would be a considerable achievement.

Now consider what other tasks (in addition to sending data from L.A. to Philly) the optional 212A Modem can help the Teleprinter do: serve as a general time-sharing device, send electronic mail, handle inquiries with a host database, and provide other advanced telecommunications capabilities with the stroke of a button.



AT&T's 5300 SERIES TELEPRINTERS

Adapts to almost any office situation.

There isn't just one AT&T 5300 Teleprinter. There are two of them, the 5310 (designed for 9½-inch paper width) and the 5320 (for 15-inch paper width). Both can accommodate up to 6-ply multipart forms.

And though the 5300 Series Teleprinters may stand alone in a physical sense, they interact with nearly every kind of office system.

Without the keyboard, this Teleprinter can be hooked up to displays, the leading PCs and processors through a standard EIA interface. The 5300 Teleprinters also support popular communications protocols and can talk with systems supporting well-known names, such as DEC* and TI.

Not surprisingly, the Teleprinter interacts with other AT&T integrated products like System 85 and System 75, with Station Message Detail Recording, and our 3B line of computers. For more information, call your AT&T Information Systems Account Executive, authorized AT&T supplier, or call 1 800 247-1212.

What more could you ask for?

© 1985 AT&T Information Systems
*DEC is a trademark of Digital Equipment Corp.

AT&T

The right choice.

NEW PRODUCTS/COMMUNICATIONS

Continued from page 72

and a full range of monitoring, control, test and restoral capabilities.

A stand-alone single unit costs $875.

Codex, 20 Cabot Blvd., Mansfield, Mass. 02048.

■

Case Communications, Inc. has added **Trellis Encoded Forward Error Correction** to its 9.6K bit/sec. **Case 4096** modem.

The added feature reportedly ensures optimum performance on long-haul lines where noise levels are high and can severely affect throughput by imposing errors.

The stand-alone model of the Case 4096 is priced at $2,995.

Case Communications, 2120 Industrial Pkwy., Silver Spring, Md. 20904.

Test equipment

Atlantic Research Corp. has introduced the **NTS 4000 Distributed Network Restoration, Test and Management System.**

The NTS 4000 provides unattended remote alarms, diagnostics and service restoration to a multisite network of up to 16,000 circuits. It permits any mix of alarm, access and switching elements to be distributed in a multivendor network. Up to 16 sites may be controlled locally or from the central site.

The system is compatible with all other Atlantic Research patching, switching and test equipment. It can control any type of network.

The NTS 4000 system is priced starting at $50,000.

Atlantic Research, 5390 Cherokee Ave., Alexandria, Va. 22312.

Auxiliary equipment

Access Data Systems, Inc. has introduced the **Auditor**, an access control chassis designed for data center installations with multiple dial-in phone lines and computer ports.

The Auditor is system transparent and accommodates from two to 128 phone lines. It is installed between the phone line and the data modem.

The Auditor answers incoming calls to the computer system and requires caller identification. User restrictions can be assigned based on time, port and identification. A full audit trail keeps a permanent record of all system access attempts.

The Auditor base chassis is priced at $4,150.

Access Data Systems, Suite 104, 766 Big Tress Drive, Longwood, Fla. 32750.

Data Switch Corp. has introduced the **V.11 Module**, which enables its data communications switching systems to support high-speed lines in X.25 networks.

The V.11 plugs into the Xy-Max Model 2840-II digital matrix switch and the Model 2810 digital switching and analog access and sparing system. It allows those products to switch between communications equipment and lines operating at up to 160K bit/sec., Data Switch reported.

The V.11 is priced at $1,150. A pair of modules for data terminal equipment and data communications equipment is required.

Data Switch, 444 Westport Ave., Norwalk, Conn. 06851.

SYSTEMS & PERIPHERALS

Turnkey systems

Tektronix, Inc. has announced five **6130S series application systems** built around the Tek 6130 Intelligent Graphics Workstation for drafting, technical data analysis and AT&T Unix software development.

The 6130S11 single-user and 6130S12 dual-user drafting systems include Plot 10 computer-aided drafting software. Single-user models come with 1M byte of random-access memory (RAM) and a 40M-byte disk. Dual-user units are supplied with 2M bytes of RAM and an 80M-byte disk. Another data analysis and presentation system, the 6130S73, also uses Plot 10. It is configured with 1M byte of RAM and an 80M-byte disk.

The 6130S71 data analysis system includes an interactive statistical program that offers graphical output capability plus multiple regression analysis and variance analysis.

For Unix-based software development, the 6130S62 system offers the Utek operating system and compilers for C, Fortran and ISO Pascal. It includes 2M bytes of RAM and an 80M-byte disk.

Prices range from $13,100 to $18,650.

Tektronix, P.O. Box 1700, Beaverton, Ore. 97075.

Processors

Digital Electronic Systems has introduced the **Computerist Mainframe (CMF)**, a multiuser 32-bit computer.

The basic CMF system includes an AT&T Unix System V tool set; a 32-bit CPU with direct memory access controller; paged memory mapping unit; 1M byte of random-access memory, expandable to 113M bytes internally; two RS-232 serial ports, expandable to 26; one Centronics Data Computer Corp.-type IBM Personal Computer printer interface; and a floppy disk controller and drive.

Prices for CMF range from $3,250 to $4,995, depending on quantity.

Digital Electronic Systems, 302 South Main, Estill Springs, Tenn. 37330.

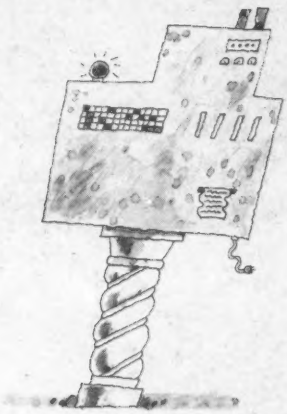
■

Heurikon Corp. has introduced the **HK68/V10** and the **HK68/VE**, part of its HK68/V family of compatible Motorola, Inc. VME microcomputer boards.

The HK68/V10 addresses AT&T

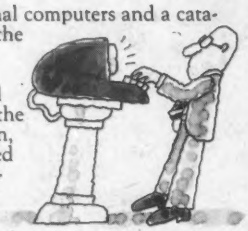
Continued on page 78

WANTED: OLD THINKER TOYS.

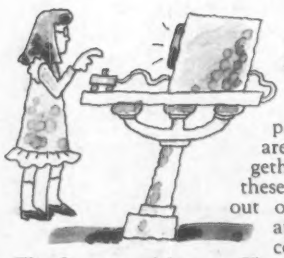


CW Communications, ComputerLand and The Computer Museum invite you to send in your early personal computers, software, and memorabilia — you could win a free trip to The Computer Museum in Boston

Your old, dusty "thinker toy" may now be ready to become a treasured museum piece. The Computer Museum in downtown Boston — an international museum dedicated entirely to computing — is searching for the very best and most unique relics of the personal computer revolution.



evolution of personal computers and a catalog highlighting the Museum's collections. If your submission is accepted for addition to the Museum collection, you will be invited to the grand opening of the exhibit and will receive a bound edition of the catalog. If your item is selected as one of the five best "finds", you will also receive an all-expense-paid trip to Boston for the grand opening party.

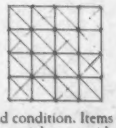


Computerland, CW Communications, and The Computer Museum are working together to bring these early relics out of your attic and into the collection of The Computer Museum. The museum is especially looking for kit machines, prototypes, programs, output, newsletters and memorabilia of early computing from around the world. A selection of the finest items will be used to create an exhibit on the



So, get up to the attic, down to the cellar and into your closets, and tell us what you find! Call or write the Museum for an official entry form, or send a photo and description of your items by March 1, 1986 to: The Computer Museum, Personal Computer Competition, 300 Congress St., Museum Wharf, Boston, Massachusetts USA 02110, (617) 426-2800, Telex: 62792318.

ComputerLand® The Computer Museum



CW COMMUNICATIONS/INC.

Entries will be judged on significance, rarity, date, completness and condition. Items particularly sought include pre-1980 machines, early serial numbers (get those number 1's out), machines made for purchase outside of North America (even modern machines are sought in this category); first releases of software such as first releases of operating systems, languages and mass-marketed and original applications; and pre-1980 photographs, newsletters, manuals and other records. The Computer Museum is a private non-profit educational institution. All donations are tax-deductible according to the provisions of the Internal Revenue Service. Thinker Toys is a registered trademark of George Murrow & Murrow Designs, Inc.

So Six Flags said,
"We need an
office integration system
to run our theme parks
nationwide."

And we said...



"Fasten your seat belts."

Six Flags is the largest operator of themed amusement parks in the country.

They need the convenience of a distributed office system and the efficiency of a centralized network. So, after evaluating 14 vendors, Six Flags decided to ride with The Honeywell Office.

THE HONEYWELL OFFICE, CONVENIENCE AND EFFICIENCY

The Honeywell Office works at each of Six Flags' 10 parks and at corporate headquarters in Chicago.

With Honeywell's versatile departmental systems, each site receives exceptional office and data processing capabilities. Without wasting costly turn-around time from a central processsor.

Now departments like Employee Relations can handle thousands of personnel letters, shift work schedules, and process paychecks. Contracts Administration can create individual vendor contracts by mixing and matching stored phrases. And with InfoCalc, an integrated electronic spreadsheet, Operations can substantially reduce the time required to coordinate the parks' round-the-clock activity.

And because all the systems run through the same office software, Six Flags also enjoys many of the efficiencies of a centralized system—like standardized corporate reports.

Different departments can also share any proprietary office programs they develop, and tie everything into headquarters' IBM-compatible mainframe.

INVESTMENT PROTECTION, TOTALCARE SERVICE

From micros, minis, and superminis, to a complete line of integrated software, The Honeywell Office is designed to be easily upgradable and fully compatible. So your hardware and software investment is fully protected.

Plus all Honeywell products are backed by TotalCare™, Honeywell's nationwide service organization that helps ensure maximum uptime. From terminal to terminal, department to department, even park to park.

After 100 years in business and more than 30 years in computers, Honeywell has earned a reputation for working with customers to solve challenging problems.

Find out how The Honeywell Office can make your information processing seem like a day at the park. Call 1-800-328-5111, ext. 2783, or write Honeywell Information Systems, 300 Concord Rd., MS810, Billerica, MA 01821.

Honeywell 100 Years

Together, we can find the answers.

Honeywell

Continued from page 74

Unix and other applications and the HK68/VE is for real-time systems.

The HK68/V10 is available with a zero-wait state Motorola 68010 CPU with up to 1M byte of on-board, dual-access dynamic random-access memory (RAM). The HK68/VE features a zero wait-state Motorola 68000 CPU, up to 1M byte of on-board dual-access dynamic RAM.

Additional features of both include up to 128K bytes of erasable, programmable read-only memory; two serial ports; and mailbox interrupt support.

In quantities of 100 or more, prices start at $895.

Heurikon, 3201 Latham Drive, Madison, Wis. 53713.

■

Integrated Digital Products Corp. has announced the **I/O Pro**, a full-duplex I/O processor that supports up to 64 ports at 19.2K bit/sec. on a single board.

I/O Pro has buffers located on the I/O controller board, providing 4K bytes per port. Expansion is accomplished by adding an eight-port concentrator, called a tap.

I/O Pro features four character sets. Each of the I/O Pro's 64 ports can select its own character set independently.

I/O Pro is priced at $3,200 for eight ports, including I/O Prod and one tap.

Integrated Digital Products, 4208 E. La Palma Ave., Anaheim, Calif. 92807.

Data storage

Sony Corp.'s Information Products Division has introduced a **writable optical disk system** for high-density storage of data and digitized images.

The writable disk system comes in two configurations: a single writable disk drive with controller and an autochanger that holds up to 50 disks. The 12-in. disks can hold up to 3.2G bytes in a constant linear velocity format or 2.1G bytes in constant angular velocity format.

The writable disk drive transfers data at 2.4M bit/sec. The writable disk controller can handle up to eight drives. Up to four controllers can be linked together.

Pricing is as follows: 12-in. disks cost $440; 8-in. disks cost $300; 12-in. drives cost $11,700; 8-in. drives cost $9,000; controllers costs $7,000; and autochangers cost $117,000.

Sony Information Products, Sony Drive, Park Ridge, N.J. 07656.

Terminals

CIE Systems, Inc. has introduced an enhanced model of its **CIE 7100** alphanumeric multiuser terminal that provides compatibility with IBM 3101, Applied Digital Data Systems, Inc. Viewpoint and Digital Equipment Corp. VT100 terminals.

The CIE 7100 features a 14-in., 20-degree tilt screen available in green or amber and a 122-key detachable keyboard. The standard format is 25 lines by 80 or 132 characters.

The CIE 7100 is priced at $595.

CIE Systems, 2515 McCabe Way, Irvine, Calif. 92714.

■

Volker-Craig, Inc. has announced the **Graphix** option for upgrading two of its terminals.

The Graphix option allows the firm's VC5000 and the VC4604 terminals to combine graphics and alphanumeric capabilities. Both can be displayed simultaneously. It is compatible with Tektronix, Inc.'s Plot 10 computer-aided drafting software.

The option is available factory installed for $945. It is also available as an upgrade kit for $450.

Volker-Craig, Suite 252, 11772 Sorrento Valley Road, San Diego, Calif. 92121.

■

Omnicomp Graphics Corp. has introduced the **Omni 2000 GDS**, a modular, multiconfiguration graphics display subsystem.

The Omni 2000 GDS offers three basic output systems. One provides for a monochrome display with one overlay plane and upward expansion capability to 256 displayable colors at 1,280- by 1,024-pixel resolution. The second provides 4,096 displayable colors, and the third provides three true-color configurations: 24 image planes with no overlays, 24 image planes with four overlay planes or 30 image planes with two overlay planes.

Each Omni 2000 GDS offers three graphics modes: plot mode, display list processing mode and image block mode. Each module is an oversized Intel Corp. Multibus II circuit card.

Basic configurations start at about $10,000.

Omnicomp Graphics, 1734 West Belt N., Houston, Texas 77043.

■

Westward Technology, Inc. has announced its **Model 3219W Monochrome Terminal**.

The 3219W terminal offers 2,048- by 1,568-pixel resolution with refresh rates near 60 time/sec. It features a 19-in. green phosphor display and offers a choice of 16 graph makers. It is software compatible with the Tektronix, Inc. Tektronix 4014.

The 3219W Monochrome Terminal is priced at $14,950.

Westward Technology, 90 Montvale Ave., Stoneham, Mass. 02180.

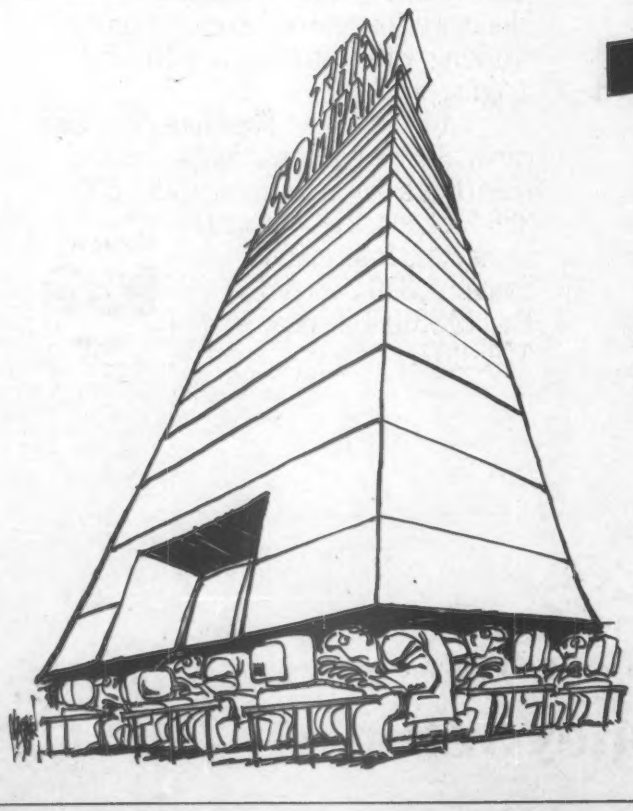
Printers/plotters

Calcomp has introduced the **5800 series**, including three multipass color electrostatic plotters with 1,024-color palettes, 400 dot/in. resolution, integrated vector-to-raster conversion, color separation and electronic registration.

All models generate 500-ft-long plots and use nonimpact electronic charge deposition technology on dielectric media including paper and film.

Besides the standard permanent color palette, the plotters allow users

Continued on page 79



THE CONFERENCE FOR OPERATIONS MANAGERS

At The Annual Parnassus Management Conference in Richmond, Virginia, you will have a chance to meet all those computer operations managers you've been wanting to talk to for so long. About operations problems that plague us all, about putting good ideas into practice, about the way everyone jumps on you when you miss your deadline by five minutes!

The problems which beset computer operations people are indeed international - they go beyond the boundaries of geography and language. Which is why Parnassus, Inc. is bringing together some 200 operations specialists from the United States and Western Europe, from March 31 to April 2, 1986 at the Holiday Inn in Richmond, Virginia.

The purpose of the conference is a non-academic exchange of ideas; chaired by people with years of practical experience. Among the speakers are Wout van Breugel (Heineken Breweries), Rouja Brzozowsky (Chase Manhattan), Tony Carroll (Imperial Tobacco Ltd.), Chester Delaney (Chase Manhattan), Raymond Fernandez (Citicorp), J. Des Lee (Brooke Bond Oxo Ltd.), Bernard V. McGinley (Pittsburgh National Bank), Gary W. Schemmel (Federal Reserve Bank of Richmond) and Berend Vis (Rabo Bank Nederland).
This is the operations conference you've been hoping someone would organize. For $1050.00 (not including air fare) you will spend three days as the guest of Parnassus, Inc., a leader in all aspects of data processing services: training and courses, technical assistance, contract staff, conversions and consultancy.

Information and booking: Parnassus, Inc., telephone 617-542-8977.

parnassus

Parnassus, Inc.,
100 Boylston Street,
Boston, MA 02116.
Telephone 617-542-8977.

Continued from page 78

to define and store up to nine additional palettes.

Prices for the Calcomp 5800 series plotters are $68,000 for the Model 5825 that handles 24-in. media widths, $91,000 for the Model 5835 plotter with 36-in. widths and $112,000 for the Model 5845 plotter with 45-in. widths.

Calcomp, 2411 W. La Palma Ave., Anaheim, Calif. 92801.

■

Miltope Business Products, Inc. has announced the **3801** nonimpact printer.

The 3801 prints 80 to 90 page/min and has a resolution of 240 by 240 dot/in. It is available in fan-fold or cut-sheet models.

Pricing for the Model 3801 is $84,000 for continuous fan fold and $86,000 for cut sheet.

Miltope Business Products, 1770 Walt Whitman Road, Melville, N.Y. 11747.

■

Advanced Technologies International, Inc. has announced the **Laserprint 2670**, a letter-quality laser printer that produces up to 26 page/min.

The unit handles print volumes up to 60,000 pages per month. The print quality is 300 dot/in. It can emulate daisywheel, printer/plotter and lineprinter functions.

The Laserprint 2670 costs $11,400.

Advanced Technologies International, 2041 Mission College Blvd., Santa Clara, Calif. 95054.

■

NEC Information Systems, Inc. has announced the **P6 and P7 Pinwriters**, two 24-wire dot matrix printers.

Both printers feature print speeds of 216 char./sec., 180 char./sec. and 65 char./sec. for high-speed draft, normal draft and letter-quality printing, respectively. They feature graphics resolution of 360 by 260 dot/in.

Prices for the P6 and P7 Pinwriters are $695 and $895, respectively.

NEC Information Systems, 1414 Massachusetts Ave., Boxboro, Mass. 01719.

Graphics systems

Calcomp is offering the **7500** series of color and monochrome graphics workstations.

The series includes the Graphics Function Manager software, a collection of graphics development aids that helps users port existing applications onto the 7500. The package also permits several applications to run concurrently on the screen.

The workstations include the National Semiconductor Corp. Genix implementation of the AT&T Unix operating system, Ethernet local-area networking, the Intel Corp. Multibus interface and IEEE floating-point format.

Monochrome and color frame buffers offer 1,280- by 1,024-pixel resolution. The color system can be configured with either four or eight planes for 16 or 256 colors from a palette of 16 million colors.

Prices for the workstations range from $20,000 to $50,000.

Calcomp, 2411 W. La Palma Ave., Anaheim, Calif. 92801.

■

Calay Systems, Inc. has introduced the **Calay V04**, a computer-aided design system for printed-circuit boards.

The Calay V04 offers interactive graphics design capabilities. It handles analog and digital boards, multilayer boards and boards using the current surface-mounted technology.

Graphics features include hard pan, zoom and rubber banding. The automatic router lays out the circuits. The system covers printed-circuit board design from data preparation, component definition and placement to postprocessing and output documentation.

The two-station V04 system is priced at $179,000.

Calay Systems, 2698 White Road, Irvine, Calif. 92714.

Auxiliary equipment

Qualogy, Inc. has unveiled **Micropac**, an enclosure for Digital Equipment Corp. Microvax and Micro/PDP-11 computers that lets users add up to 640M bytes of Winchester mass storage to their system chassis.

The single-skin pedestal enclosure can contain a DEC BA23 micro chassis and a Cyclone subsystem chassis.

With Micropac, users reportedly can expand their BA23 systems by up to six 5¼-in. drives within one enclosure.

Cyclone series products with Micropac packaging range in price from $9,095 for a 36M-byte system to $23,095 for a 640M-byte system.

Qualogy, 2241 Lundy Ave., San Jose, Calif. 95131.

■

Optical Coating Laboratory, Inc. has announced the addition of the **Spectra** polymer filter to its Glare/Guard product line of glass filters for VDTs.

Spectra works with both color and monochrome screens.

According to a spokesman, the Spectra filter enhances the contrast between image and background, maintains high resolution and improves screen clarity.

Spectra is priced at $34.95, the vendor said.

Optical Coating Laboratory, 2789 Northpoint Pkwy., Santa Rosa, Calif. 95402.

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COMPUTERWORLD

How Sperry helped a world-famous movie star become an expert in systems integration.



You recognize, of course, the hands of Mickey Mouse.

For over ten years now, Sperry has played a major supporting role at the company that Mickey built. Walt Disney Productions.

The Sperry presence is quite a production in itself. And an impressive case study in systems integration.

There are six Sperry mainframes within the Disney organization—one at the Walt Disney World Resort in Florida that talks with five in the Los Angeles area. Together, these systems run over 150 batch and on-line applications for the various Disney divisions and subsidiaries.

"Together" is the right word, too. The six mainframes are linked to 1200 terminals. But to terminal operators, whether in Florida or California, it's all one big computer. Sperry Data Communications Processors take care of the complex data-location chores.

Disney also uses our SPERRYLINK™ Office System, with 250 work stations handling such tasks as word processing and electronic mail. Sperry PC's are part of the act, too. There are over 200 of them distributed throughout the corporation.

The applications handled by all this Sperry hardware reflect the diversity of the Disney organization, itself. There are systems that analyze market response to feature films and adjust the advertising to suit. Systems that predict attendance at Walt Disney World attractions and schedule resources accordingly. Systems for cable TV programming on the Disney channel.

And on and on.

Yet everything works together, even though each system serves its department or division uniquely.

With Sperry, you see, information has a way of getting into the hands of the people who need it.

To learn more about our solution-oriented systems for business, industry, and government, call us toll-free: 1-800-547-8362, ext. 600. Or write.

Sperry Corporation, Box 500, Blue Bell, PA 19424-0024.

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SPERRY

COMPUTER INDUSTRY

INDUSTRY INSIGHT
Clinton Wilder
CW Senior Writer

Chip actions signify little

Now that the Reagan administration has turned into a would-be Santa Claus for U.S. companies struggling against international trade deficits, the time seems right to comment on the curious logic of protectionism in the semiconductor industry.

Most of the action so far has come in the dynamic random-access memory (RAM) market, with antidumping petitions against the Japanese filed by both the private and public sectors. The moves raise the obvious question — what exactly is it that we are trying to protect?

If we're talking 64K-byte and 256K-byte versions, it certainly can't be market share. With a couple of exceptions, the speed with which U.S. chip vendors have abandoned the low-end memory chip market rivals the megahertz rate for instructions on a state-of-the-art microprocessor. And those that didn't move out soon enough before the Japanese onslaught have suffered the consequences, as Dallas-area neighbors Mostek Corp. and Texas Instruments, Inc. can attest.

The U.S. Department of Commerce and the International Trade Commission appear certain eventually to confirm some evidence of Japanese chip vendors hawking their wares in the U.S. below production cost. But the true litmus test is to ask just how big a role did dumping play in knocking most U.S. players out of the market. In other words — the words that the Japanese are sure to argue — would the history of dynamic RAM have been the same anyway, given the record-high dollar, U.S. vendors' overcapacity, slackened market demand and the inevitable learning curve price drops?

In most U.S. chip industry circles, with the possible exception of the immediate vicinity of Boise, Idaho, all the dynamic RAM sound and fury signifies very little. For Boise-based Micron Technology, Inc., its antidumping ef-

See **CHIP** page 92

Trilogy banks on Elxsi sales

Three-pronged strategy aims at parallel processing

By Clinton Wilder

After a lifelong career of designing computers, Gene Amdahl is now trying to help sell Joseph Rizzi's computers — and to gain back some respect for loss-plagued Trilogy Ltd.

Rizzi is chief executive officer of Elxsi, the San Jose, Calif., parallel processing systems vendor recently acquired by Trilogy. With Trilogy's former $270 million cash coffers now down to about $40 million, Elxsi and its 6400 minisupercomputer probably represent Trilogy's last chance to achieve any noticeable sales in the computer business.



Trilogy's Gene Amdahl

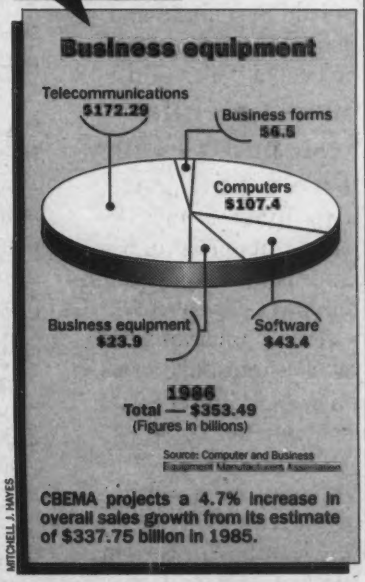
"To commercialize anything, you need a product," the 62-year-old Amdahl told *Computerworld* during a recent tour with Rizzi to promote the merged companies. "We decided to put what we learned from Trilogy's research into Elxsi as our entree into the computer field. We didn't want to be a landlord or a technology company. We want to be a computer company, and now we are."

The sentiments represent quite a change from six years ago, when Amdahl founded what he intended to be a computer company — and an earthshaking one at that. But Trilogy's ambitious plans to design and build supercharged IBM-compatible mainframes based on integrated wafer-scale technology foundered on a well-documented sea of troubles [CW, March 25]. With its ambitious project scrapped, 70% of its original financing gone and its lavish Cupertino, Calif., facilities staffed mainly by lessees including Electronic Data Systems Corp., Trilogy went shopping earlier this year.

"We decided on a three-pronged strategy," Amdahl said. "We would extract what technology we could [from Trilogy's original research and development], pro-

See **TRILOGY** page 88

DATA VIEW



MITCHELL J. HAYES

CBEMA projects a 4.7% increase in overall sales growth from its estimate of $337.75 billion in 1985.

Honeywell cuts 600 employees

By Clinton Wilder

BILLERICA, Mass. — In its second work force reduction of the year, Honeywell, Inc.'s Small Computer and Office Systems Group last week announced the layoff of 600 employees in Massachusetts in what it called a streamlining move.

The division, which terminated 130 positions last April, decided to cut back expenses for a major push into the integrated office systems market, according to the group's Vice-President Eugene Manno. The layoffs, to be posted Jan. 17, will affect employees in manufacturing, engineering, marketing and administration in five Massachusetts locations. But Honeywell plans to add 100 to 150 people to the office systems sales force in early 1986, Manno said.

The layoffs will represent about 17% of the office systems division's 4,000-member work force, all of it based in Massachusetts. Honeywell employs about 8,200 in the state.

"In a tight market, you have to put the

See **HONEYWELL** page 88

INSIDE

Most analysts expect Apollo Computer's stock price to rebound, but it hasn't happened yet/**85**

The leasing industry's trade association supports the U.S. House of Representative's latest tax reform plan but is split over elimination of the investment tax credit/**86**

Most Japanese semiconductor vendors react calmly to recent U.S. government trade moves against them/**87**

INSTANT ANALYSIS

"When Wang turns the corner, everybody can heave a sigh of relief."

— Don Bellomy of International Data Corp. on the computer industry outlook for 1986

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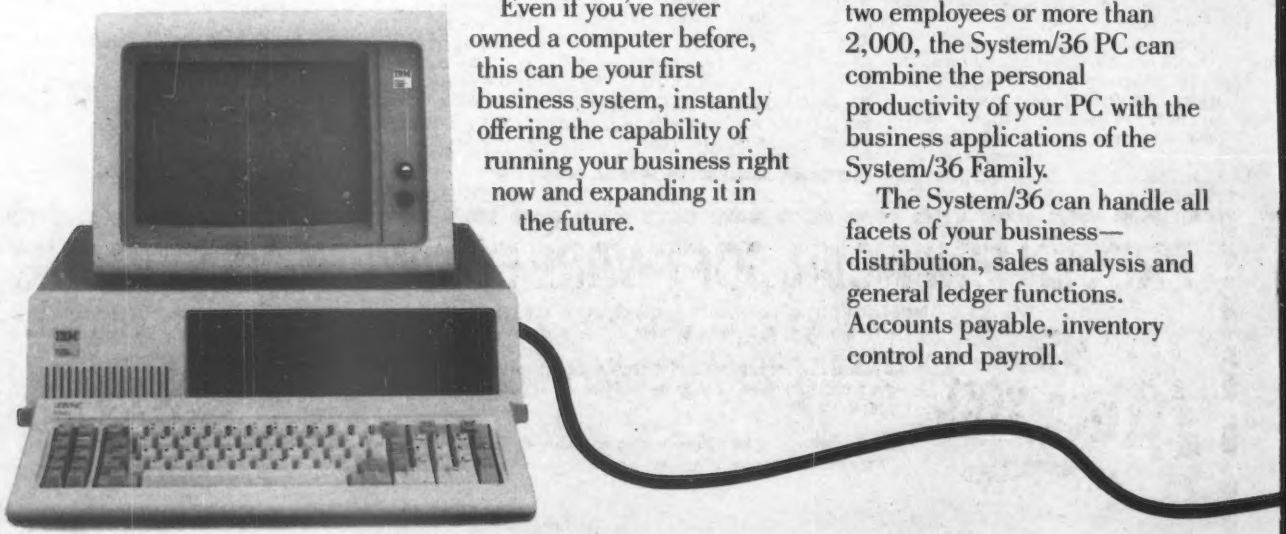
There's a new IBM product that marries the IBM System/36 and the IBM Personal Computer to give you the best of both worlds.

The newest member of the System/36 Family starts at only $5,995.

It's called the IBM System/36 PC.

Very small but it opens up new worlds for your personal computer. Very affordable yet capable of running System/36 programs that will help you run your business.

Even if you've never owned a computer before, this can be your first business system, instantly offering the capability of running your business right now and expanding it in the future.



Multiuser system.

System/36 PC can be a standalone computer for small companies or a departmental system or even part of a distributed network for larger companies, providing multiuser access to data.

The System/36 PC is made up of a 5364 Processor attached to an IBM PC, PC XT or PC AT. And you can connect up to three more of these personal computers. Or you can connect terminals such as System/36 printers or displays.

Flexibility.

Whether your business has two employees or more than 2,000, the System/36 PC can combine the personal productivity of your PC with the business applications of the System/36 Family.

The System/36 can handle all facets of your business—distribution, sales analysis and general ledger functions. Accounts payable, inventory control and payroll.

IBM System/36 PC.

And you can get traditional PC functions such as spreadsheets and word processing.

Software for the System/36 has been developed over the years and has proven invaluable in all kinds of businesses of all sizes. And with the thousands of programs written for both IBM PC and System/36, the sky's the limit for business and planning applications.

The System/36 PC even provides you with data security features so that the right data gets into the right hands.

Small yet powerful.

All of this processing power can sit right on a desk or under it —either horizontally or vertically. It measures a mere 21¼"x16¾" x6½"—about the size of a small suitcase.



Yet as small as it is, this little box has multiple processors, with main memory that can be dedicated to running your business functions. In plain English, this means you can get better response time. The System/36 PC comes with a 1.2 MB diskette drive and either 40 or 80 MB disk storage, depending on your information storage needs.

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The System/36 PC is easy to learn and to use. If you need assistance, it has over 2,800 "help" screens that take you step-by-step through any rough spots. You can merge data you've generated on your PC with information that's on your System/36 PC. And you can share information that is stored in the System/36 PC with other attached IBM Personal Computers or System/36 terminals.

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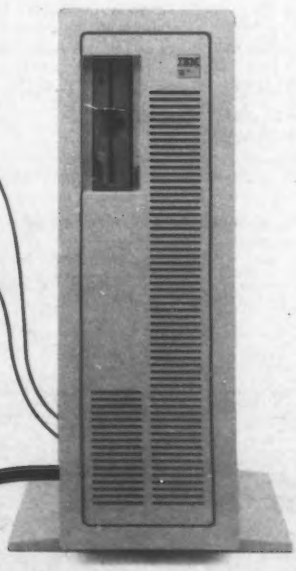
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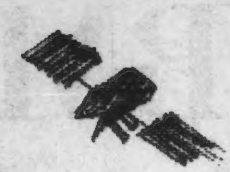
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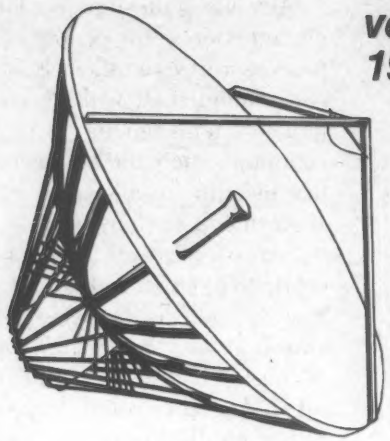


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Apollo struggles with quarter losses, strong competition

By Kathy Porteus

Apollo Computer, Inc.'s stock has yet to recoup what it lost in price per share on Sept. 24.

On that day, reacting to news that Apollo expected a third-quarter loss of $18 million, the company's stock tumbled 21%, closing at $12.25. For much of the recent market surge, Apollo hovered in the $11 to $12.50 range until a Thanksgiving Day rally among technology stocks boosted Apollo to $14. Nevertheless, investor uncertainty about Apollo's prospects continues to check any major advance in stock price.

Most analysts agree that Apollo is yet another victim of the ongoing computer industry slump. Carol Muratore, a vice-president with Prudential-Bache Securities, Inc. said, "We will know for certain whether or not Apollo's third quarter was an earnings blip when there is a pickup in the industry." According to David Wu, analyst with Montgomery Securities, Apollo is experiencing a short-lived lapse in profitability but should "rebound nicely because the firm expanded its customer base by 50% in the first nine months of 1985."

Analysts estimate that Apollo will break even in the fourth quarter of 1985 and earn 60 to 65 cents per share in fiscal 1986. However, John Rohal, vice-president with Alex Brown & Sons, Inc., was quick to point out that Apollo is "in a period of transition, and, therefore, the earnings model of the firm is not as predictable as it has been for the first three or four years of the company's existence."

Much of the skepticism surrounding Apollo stems from increased competition in the engineering and scientific workstation market. Digital Equipment Corp.'s Microvax II is making a splash with unit shipments exceeding 5,000 since its May introduction.

Craig Symons, analyst with Gartner Securities Corp., said he believes DEC's Microvax II will affect Apollo in much the same way the IBM Personal Computer knocked Apple Computer, Inc. off its perch.

IBM poses another threat to Apollo's market share. Although IBM has yet to announce its long-awaited engineering workstation, analysts are already commenting that the No. 3 slot in a growing market, like that for workstations, will not be such a bad place for Apollo.

Rohal of Alex Brown suggested that Apollo could even slip to fourth position since Sun Microsystems, Inc., a private company, has "really taken the momentum in the marketplace away from Apollo."

In addition to meeting competitive pressures, Apollo must make the transition from successful start-up to large, mature company. The resignation of Apollo's founder and chairman, John Poduska, underscores the cultural and business changes of such a transition.

ACTIVE ISSUES

Recently, Apollo addressed some of its strategic shortcomings. Until this year, three OEM customers accounted for much of Apollo's business. But as of September of this year, Apollo shifted its customer mix to 40% OEM and 60% end user. Also, Apollo is moving from its proprietary systems architecture to embrace AT&T's Unix and connect to IBM and DEC operating environments.

Despite uncertainty as to timing, most analysts expect Apollo's stock price to rise as the firm's earnings improve during the next year.

Porteus is president of Strand Research Associates, a Centerville, Mass.-based company that provides customized reesearch services for financial and high-tech firms.

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INDUSTRY NOTES

Uccel buys subsidiary of Rand

Uccel Corp. recently announced another in its recent flood of acquisitions, this time of a Raleigh, N.C.-based vendor of software that facilitates migration from the IBM DOS to the MVS operating system. Uccel bought, for $3 million, the Conversions, Inc. subsidiary of Rand Information Systems, Inc. of Alameda, Calif. The purchase also includes Rand's Exitdos, another conversion product, as well as software exchange with Rand for internal use. Uccel will solicit its installed base for customers of Rand systems conversion services.

■

Another acquisition-minded firm, Lee Data Corp. of Minneapolis, last week purchased Phaze Information Machines Corp., an IBM 3270-compatible terminal vendor in Scottsdale, Ariz. The move gives Lee Data an IBM clone for the low end of its terminal and workstation product line. The purchase will be a $1 million cash acquisition, and Lee Data will retire Phaze's $770,000 convertible debt. Phaze, with sales of $6.5 million in 1984, will operate as a wholly owned subsidiary of Lee Data.

■

Hewlett-Packard Co. restored all of its U.S. salaried workers and some hourly workers to full-time employment effective Jan. 1. The workers were taking two unpaid days per month as part of HP's no-layoff cost reduction program. The 30,000 salaried workers will be paid 5% below their normal salaries at least until April. The returning hourly workers will be paid at full salary.

■

Monday, Dec. 9, was not a bad day for Cray Research, Inc. The Minneapolis supercomputer leader completed deals for two X-MP/24 systems, one sold for $10 million to AT&T Bell Laboratories and another leased for $16 million to the National Aeronautics and Space Administration's Lewis Research Center in Cleveland. To put this in perspective, a year of $26 million revenue days would make Cray a $9.49 billion

See NOTES page 92

Leasing industry backs latest tax reform bill

But CDLA split over tax credit

By Mitch Betts

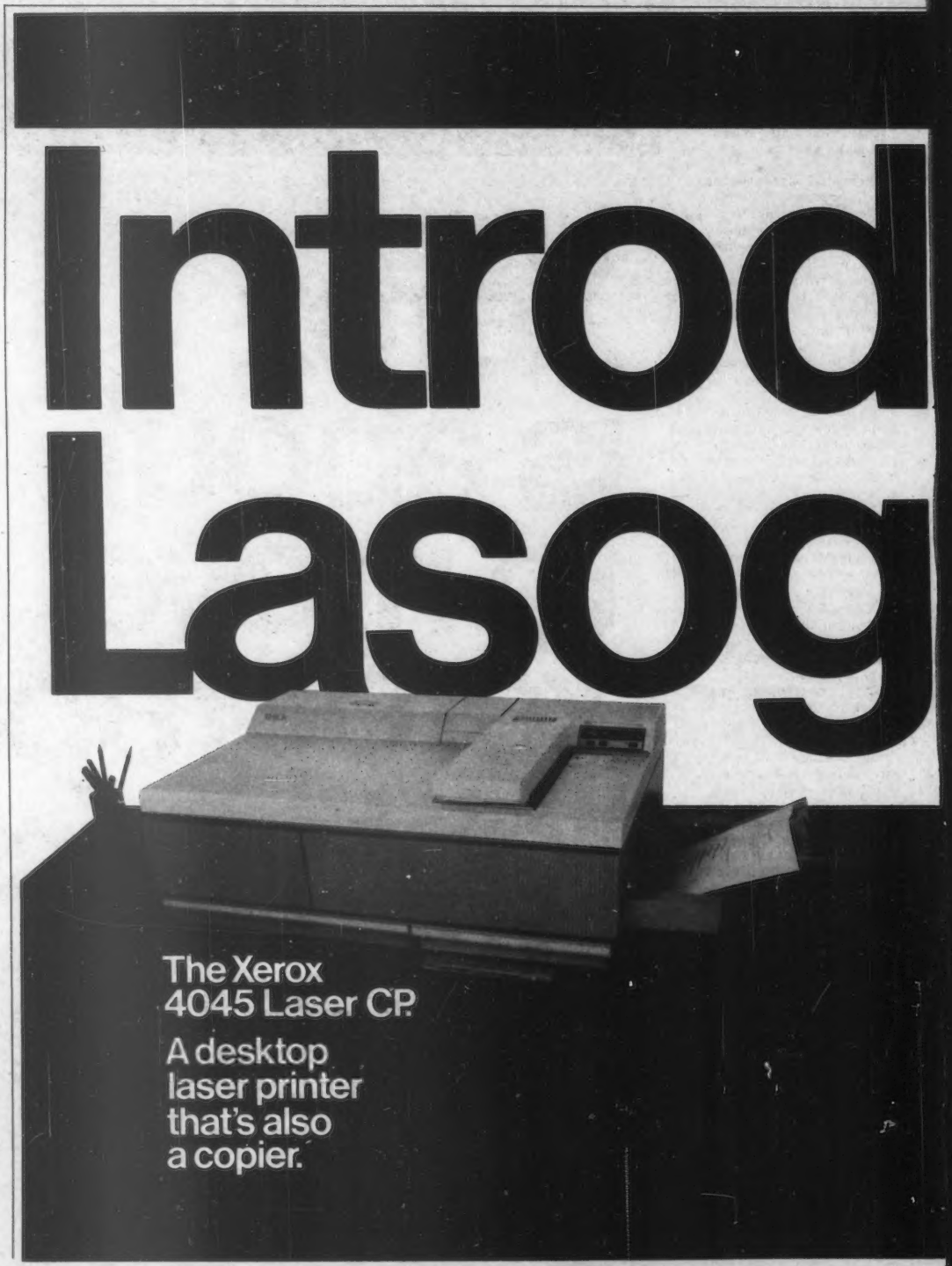
WASHINGTON, D.C. — The computer leasing industry is supporting the latest federal tax reform bill because it places computer equipment in the five-year tax depreciation category, James F. Benton, executive director of the Computer Dealers and Lessors Association (CDLA), said last week.

But Benton said the CDLA is taking a neutral position toward the proposed elimination of the 10% investment tax credit because the association membership is "split right down the middle."

Benton commented on the tax reform bill written by the Ways and Means Committee of the U.S. House of Representatives [CW, Dec. 2]. If passed, the bill will cut corporate income tax rates, reorganize the equipment depreciation schedule, eliminate the investment tax credit and reduce many other credits and deductions.

Computer leasing is expected to generate $9.25 billion in revenue this year, up 25% from 1984, according to International Data Corp. (IDC), a market research firm in Framingham, Mass. Lessors retain any tax benefits from purchasing hardware, and then lease the equipment to users.

Earlier this year, the



CDLA lobbied hard to revise the U.S. Department of the Treasury's tax reform plan, which placed computer equipment in an eight-year depreciation category that Benton called "ludicrous and unrealistic."

He said the five-year schedule approved by the Ways and Means Committee is similar to the CDLA's own recommendation, although the CDLA previously sought a three-year schedule [CW, March 11].

Benton said that under the accounting procedures proposed by the committee, 40% of a computer purchase can be depreciated in the first year and 24% in the second year. He called the plan "very realistic and very fair."

Concerning the 10% investment tax credit, Benton reiterated that its loss would increase costs for lessors, who would then pass the higher costs to their customers.

But many CDLA members see advantages to killing the credit, he added. "We can get back to our traditional business of computer leasing, rather than tax-advantaged transactions, which we've never made as much money on anyway," Benton said.

Moreover, this would remove the distasteful tax shelter label from computer leasing, he acknowledged.

Leslie Townsend, a leasing analyst with International Resource Development, Inc. of Norwalk, Conn., agreed that computer leasing firms have mixed reactions to tax reform. Loss of the investment tax credit would eliminate one of the industry's financial benefits, but it would also reduce paperwork burdens for obtaining the federal credit, she said.

Losing the tax credit is more upsetting to the transportation leasing industry, mostly because of the huge cost of aircraft and ships, she said.

Japanese vendors unfazed

By Takehisa Kondoh
Computerworld News Service

TOKYO — Most Japanese semiconductor vendors appear unperturbed by the U.S. Department of Commerce's preliminary ruling against them for dumping 64K-byte dynamic random-access memory (RAM) chips in the U.S. market [CW, Dec. 9].

Fujitsu Ltd., Hitachi Ltd., NEC Corp., Oki Electric Co. and Toshiba Corp. responded by saying they have shifted focus from producing 64K-byte RAM chips to producing 256K-byte RAM chips.

Only Mitsubishi Corp. said it is ready to "explain [to the Commerce Department] what we are actually doing and let them know there's been no dumping."

Firms required to post bond

The Commerce Department reportedly has reason to believe that Mitsubishi was selling its semiconductors below cost and has required the company to post a bond equal to 94% of the total value of the semiconductors that Mitsubishi imports into the U.S.

Similar bonds have also been required of Hitachi (18%), Oki Electric (13%) and NEC (8.9%).

Mitsubishi said it believes that the Commerce Department sympathizes with the antidumping complaint made by Micron Technology, Inc. of Boise, Idaho, and has ignored the data submitted by Mitsubishi.

Other vendors calm

Japanese semiconductor vendors other than Mitsubishi remained calm toward the Commerce Department's action, many because they are now producing chips for U.S. customers at plants in the U.S.

Chips manufactured or assembled in the U.S. are less likely to be affected by import restrictions. NEC, Toshiba, Hitachi and Fujitsu are currently producing chips, mostly 256K memories, in California and Texas.

The Japanese semiconductor manufacturers said they have yet to formulate a position on the Reagan administration's own predatory pricing petition against several of them. But many Japanese semiconductor makers said that they are increasingly concerned about potential U.S. trade restrictions.

Kondoh is Tokyo bureau chief for the Computerworld News Service.

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Honeywell cuts staff

From page 81

wagons in a circle," Manno said. "We know perfectly well it will be a tight year. We expect the integrated office systems market to grow by 20%, but there are a whole bunch of people out there selling to it. We don't think the marginal ones will be around too much longer, and we had to get our costs in line."

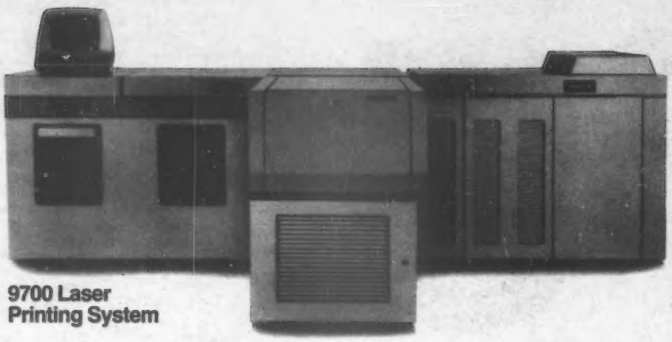
Manno said Honeywell has targeted the superminibased, departmental office systems arena as a key growth niche — a strategy announced by several vendors in the past year. In addition to traditional players such as Digital Equipment Corp., Data General Corp. and Wang Laboratories, Inc., major firms such as Prime Computer, Inc. and Hewlett-Packard Co. have made the office automation arena a crowded one.

"There is IBM dominance in the mainframe and micro fields, but not here," Manno said. "There is more room to compete and more growth — a good place to put your bet."

Honeywell's actions also included a commitment to dedicate 40% of its small-computer sales force to specialized distribution channels such as value-added resellers and the consolidation of its existing national reseller program into the small computer group.

Effective Jan. 1, the group will also reorganize along functional lines, which will allow the job elimination, Manno said. Marketing and production of small office machines and DPS 6 minicomputers will now be combined. Marketing will be handled by the new Office Marketing Systems Division and production by the Small Computer Producer Division.

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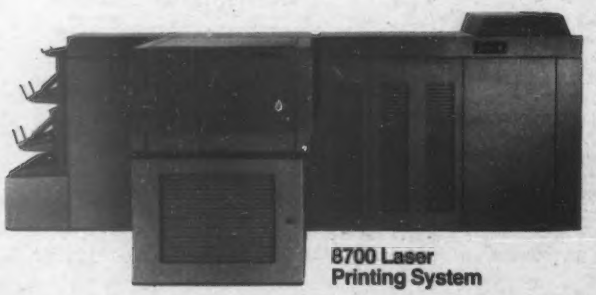
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3700 Laser Printing System



8700 Laser Printing System

Trilogy banks on Elxsi sales

From page 81

duce revenues by leasing parts of Trilogy's center and use our cash to back a product. We looked at semiconductor and workstation manufacturers as well as parallel processors. We decided parallel processing was the future market, the way computers had to go. Semiconductors could be, but the field was overcrowded."

By teaming up with Elxsi, Amdahl, who pioneered the IBM 360 architecture and later the Amdahl Corp. IBM plug-compatibles that still bear his name, has entered a new world — one dominated by the computers of Digital Equipment Corp. Although a system upgrade announced last week is said to make the Elxsi 6400 comparable to a Cray Research, Inc. supercomputer for certain applications [CW, Dec. 9], most of its sales will come in the high-end DEC arena.

"In 90% of our sales situations, we're selling against DEC as the alternative," Rizzi said. "If the customer's foreseeable need is for a single VAX 8600, DEC owns that. But if the customer in the increasingly computation-intensive engineering world wants something bigger and 20% to 30% faster, we do that much more cheaply than the DEC upgrade strategy, which is a cluster."

Rizzi admits that Elxsi is "traveling in uncharted waters" in selling to the ill-defined parallel processing market. That is where Amdahl and the cash reserves of Trilogy are valuable.

"Ours is a big machine that forces people to make deliberate decisions on a long-range commitment," Rizzi said. "One of the most important things when you make that commitment is the company behind the product. With the merger, we have access to a lot of capital. We don't have to be 100% preoccupied with the next quarter and weathering a slow market."

The going has been slow for Elxsi, which was privately held before the merger. The firm lost $12.5 million on $16.4 million in sales in the first nine months of 1985. In 1984, Elxsi lost $7 million on sales of $18 million.

But Trilogy expects those results to turn around soon, having staked its last remaining hope for a revenue-producing product on 7-year-old Elxsi. If the 6400 can fly, Trilogy will be able to continue its work in other areas, such as R&D with other computer vendors on its high-density interconnect known as a multichip module. But until Elxsi's growth is a reality, Trilogy will clearly operate in retrenchment mode.



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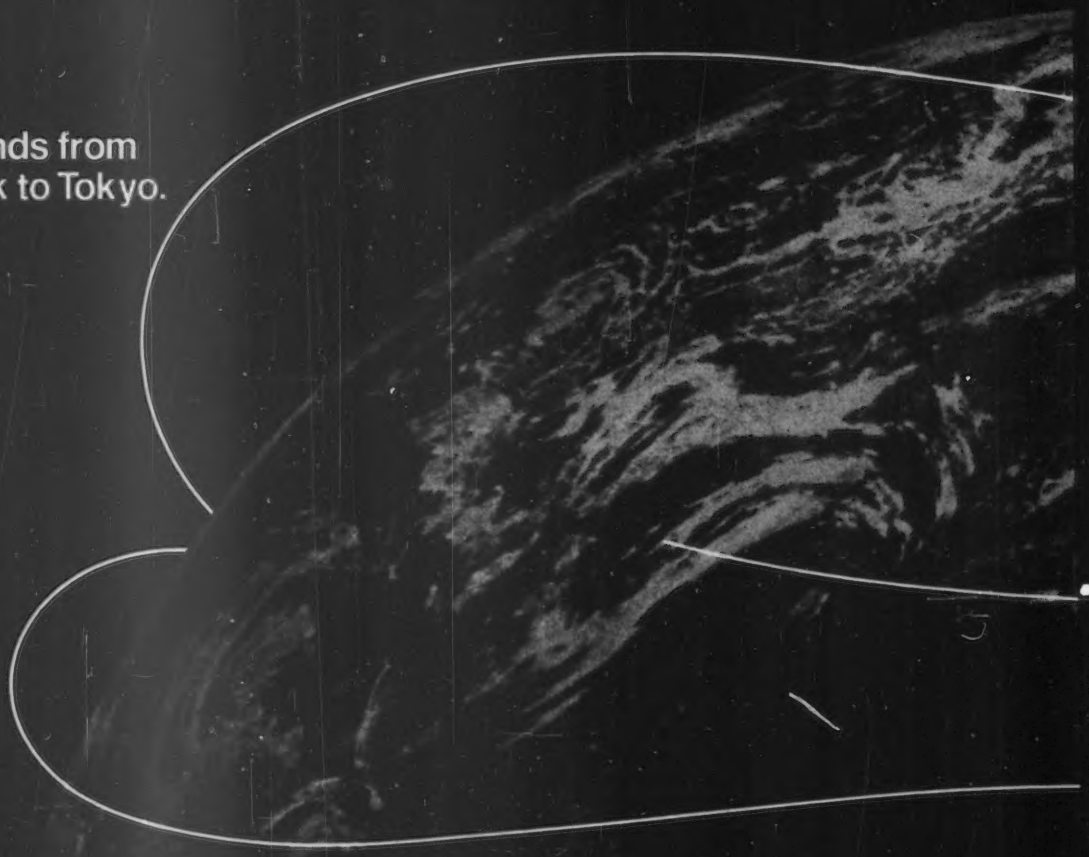
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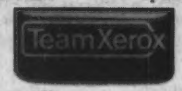
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Chip actions signify little

From page 81

forts have been worth their weight in trade press ink. But even for Micron, and certainly for the rest of the U.S. industry, the value of the administration's stronger trade policy won't be known for quite a while.

U.S. market share in the low-end memory market is history, and protective tariffs against the Japanese will not do much to raise prices or new fabrication plants in this country. The important battles will be waged in microprocessors, 1M-bit and larger memory chips and application-specific circuits such as Advanced Micro Devices, Inc.'s new chip-of-the-week offerings.

The stronger U.S. government stance shown in the last several weeks might convince Hitachi Ltd., NEC Corp. and others to modify their aggressive, market-share-or-else approach to U.S. sales of future generations of semiconductors. However, that hypothesis seems more like wishful thinking than strategic marketing.

In any segment of the electronics business, U.S. trade policy is not likely to alter the maxim that has been proven time and time again: When the technology becomes an off-the-shelf commodity, the U.S. loses. If it becomes cheap and easy to make 4M-bit memory chips in Japan in the next few years, it spells trouble for U.S. firms — no matter what a trade policy strike force might do.

Is there also a downside risk to more aggressive U.S. trade policy in semiconductors? The answer is "yes." If the ultimate result is higher prices for Japanese-made RAM chips — virtually all RAM chips — it is the U.S. computer industry that stands to lose.

Cray Research, Inc. Chairman John Rollwagen, who admittedly has an annual $75 million vested interest in dynamic RAM prices for his mega-number crunchers, recently pointed out that higher prices are the reward that the Japanese have sought in the market share war. It was no surprise, for example, when NEC, Toshiba Corp. and Fujitsu Ltd. recently announced approximately 20% price hikes on 64K-byte and 256K-byte dynamic RAM chips.

What was surprising was that NEC tried to paint the increase as a conciliatory measure, and one national newspaper — not known for in-depth business coverage — noted that NEC had "ended the price war." Isn't that the whole idea of a trade war — to grab market share and then raise prices?

Unfortunately for U.S. vendors, the war in dynamic RAM chips ended many months ago. And to the victor went the spoils.

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INDUSTRY NOTES

NOTES from page 86

company — or about one-fifth the size of IBM.

■

Intelogic Trace, Inc. recently added the products of a leading local-area network vendor to the list of hardware it services. Intelogic Trace will support the local-area nets of Nestar Systems, Inc., including the token-ring net it introduced at Comdex.

■

Two vendors, AST Research, Inc. and Wicat Systems, Inc., recently announced sales reorganizations. AST Research, based in Irvine, Calif., consolidated the sales and marketing efforts for its IBM Personal Computer add-on products into a single organization.

Wicat Systems of Orem, Utah, a vendor of specialized micro systems for business training and education, centralized its sales force by dissolving three divisions. Sales personnel who previously concentrated on either general systems, training systems or education systems will now sell Wicat's entire product line.

■

In a potential early indicator for the Christmas selling season, retail microcomputer sales in October trailed those of 1984 by 4.2% in units and 13.5% in revenue, according to Future Computing, Inc. The loss leader was Apple Computer, Inc., with unit sales 33.6% below the October 1984 level.

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For more information, contact Ed Marecki, Vice President/Sales, Computerworld Focus, 375 Cochituate Road, Framingham, MA 01701, (617) 879-0700. Or call your local Computerworld sales representative.

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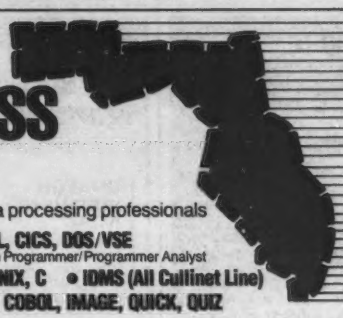
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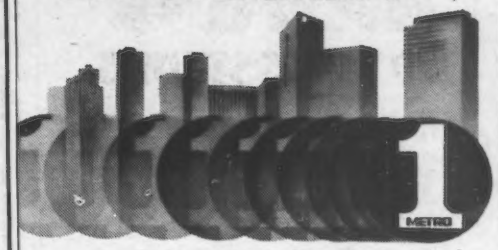
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Dynamic mfg. conglomerate seeks tech astute S/A for executive support sys. Environ. incl. DEC-10, VAX, COBOL, DATATRIEVE & PC's. Provide hi-level strategists w/interactive decision sys. $35,000.

BOSTON
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Estab. Providence fin'l. svc. firm seeks mgr. of staff of 20 opns. & tech svcs. personnel. Environ. is IBM 30XX OS/MVS. N.E. candidate preferred w/knowl. of capacity planning. Salary to $50,000.

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Principals only. Send resume to:

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- Responsibilities include development of Computer Systems for client contracts. Will be involved in analysis, design and coding of various computer programs. Responsible for enhancement and modification of existing systems. Responsible as called upon, for the preparation of technical reports, special studies and manuals. Will, when necessary, supervise programmers and work closely with client users to propose modifications to existing systems. Must have 2 years in job being offered or 3 years as Programmer/Analyst. Experience must include work on larger IBM type main frames such as ICL, Honeywell, Burroughs, UNIVAC; programming languages should include at least one of the following: COBOL, PL/I, Assembly. Experience with on-line systems using large scale data bases such as CICS, IMS, DL/I, DHS, Total ADABAS. 40 hr. wk., 9-5. Salary $32,800 to $35,700 per yr. D.O.T. code 012167066. Mail resume to: NYS Job Service JO # NY 8010080 175 Remsen Street 2nd Floor Brooklyn, New York 11201.

COMPUTER SYSTEMS ANALYST wanted to design, develop and implement new computer software systems for patient management and accounting applications; design/code online input/output screens and flows, design/code forms/reports; develop work plans, time/cost estimates and manpower requirements and develop system user documentation and train users of systems; Requires M.S. in Computer Science; $28,000.00 per year; 40 hours per week. Send resumes to 7310 Woodward Ave., Room 415, Detroit, MI 48202. Ref. #68885. "Employer Paid Ad"

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Institute of Systems Science (Education Division)

Calling Computer Professionals Who Have Set A Cracking Pace

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You will have had experience in:
- Planning for Information Resource Management
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You will have 3 or more years as an I/S manager after success as a technology professional, have succeeded consistently in setting and meeting demanding cost/benefit productivity and quality goals, and have had enjoyed direct interaction with executive and senior management to sell innovation.

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You will have had experience in:
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Mr. Peter Lim
Director, North America Office
National University of Singapore
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Administrative Computer Services

Manager, Systems and Programming - The Systems and Programming Manager is responsible for the installation, evaluation and maintenance of all systems, software, and software packages utilized by the computer center.

QUALIFICATIONS: • Min. of 5 yrs. of large mainframe computing exp. including 2 yrs. of supervisory exp. in programming. • Strong application systems analysis skills and technical strength in operating systems, data base management and high level language. • Knowledge of standards and procedures for software development.

Manager, User Support Services - The User Support Services Manager is responsible for coordinating the resources of the computer center with end-user requests for data processing services. The User Support Services Manager works with departmental personnel in systems acceptance testing, problem resolution, and the development of user documentation and training programs.

QUALIFICATIONS: • 3 yrs. programming experience or 2 yrs. application software development on large mainframe computer. • Strong systems analysis skills • Exp. in distributed processing systems and user training preferred.

Systems Programmer - The Systems Programmer is responsible for implementing and maintaining all systems software as well as the data base management system for the central mainframe system, organizing and preparing systems software documentation and identifying methods to optimize data access procedures.

QUALIFICATIONS: • 2 yrs. of programming exp. on large mainframe computer system. • Technical exp. with the implementation of online transaction processing monitor and data base management system. • Exp. with NCR VRX operating system and PLUS-4/MBASE-9 data base management system preferred.

Bachelor's degree in computer science or a related field. Extensive exp. in the areas indicated will be considered in lieu of the formal education requirement.

Applications will be accepted until the positions have been filled. To apply, submit a letter of application and resume to: **A.J. Brooks, Director of Personnel, Sinclair Community College, 444 W. Third St., Rm. 7340, Dayton, OH 45402. An equal opportunity employer.**

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University of Pittsburgh

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To effectively lead in planning, development, and support for academic computing in this environment, the Academic Computing Group of Computing and Information Systems must have the highest quality professional staff. Candidates must be technically competent and creative with strong interpersonal skills. A baccalaureate degree, and training and/or experience in computer systems and languages are required.

Salary will depend on qualifications. The University offers an excellent compensation package, including excellent educational benefits. The City of Pittsburgh provides varied and stimulating social and cultural environments.

To apply for a position of System Analyst/Programmer in the Academic Computing Group, please send a letter of application; a current resume; official transcripts of all college work; and the names, addresses, and telephone numbers of at least three references to:

Joseph D. Witucki
172 Thackeray Hall
University of Pittsburgh
Pittsburgh, PA 15260

Applications must be received by January 13, 1986.

To request more information or to discuss details of the position, call Mr. Witucki at (412) 624-6700.



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BERMUDA GOVERNMENT MINISTRY OF FINANCE

CONTROLLER, DATA PROCESSING UNIT

The Bermuda Government is seeking a Controller to take charge of its Central Data Processing Unit. The Unit supports all electronic data processing and office automation activities within the government. It operates a central IBM System/38 computer, plus distributed minicomputer and microcomputer facilities when appropriate. The areas of application cover all aspects of the government's activities. The establishment of the Unit comprises ten professionals, 15 technical and 12 clerical staff.

The Controller is responsible for the direction and control of EDP and office automation activities within government, under the policy guidance of the Financial Secretary and the Minister of Finance. The post reports through the Financial Secretary to the Minister of Finance.

The successful applicant will have a relevant degree or equivalent professional qualification in the field of data processing, and will be able to demonstrate a minimum of ten years EDP experience. A sound knowledge of IBM System/38 equipment is essential, and significant exposure to microcomputer hardware and software is also very desirable. Applicants must have experience at a senior management level within EDP, and have been responsible for not less than 25 to 30 staff.

The salary of the post will be Bermuda dollars 57,353.00 per annum. The Bermuda dollar is kept at par with the US dollar.

There is no income tax in Bermuda, but the cost of living is high, particularly rent which can be expected to be 25 percent of salary for a married person with family.

Airmail applications, providing details of employment experience, qualifications held, and relevant personal information should be forwarded to:

THE SECRETARY
PUBLIC SERVICE COMMISSION
GENERAL POST OFFICE BUILDING
HAMILTON
5-24
BERMUDA

Home and business telephone numbers (treated in confidence) should also be provided.

Applications to arrive in Bermuda not later than the 3rd of January, 1986.

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We are currently seeking System 36/38 programmers with 2-3 years experience that possess the following qualifications:

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These positions involve database applications on PRIME computer systems in scientific and clinical research areas, development of database structures and programming procedures, user consulting and computer-to-computer data transfer between US and UK computer systems. A scientific background and PRIMOS, FORTRAN and database experience are required. Some experience with 4GL relational database systems and micro-mainframe links is desirable.

RESEARCH SYSTEMS MANAGER

This position is for a Manager-Technologist who will head-up a new group for research applications. The position requires an individual with extensive experience in scientific computer applications with emphasis on database design and implementation, and ten years experience in project management. Emphasis will be placed on knowledge of PRIMOS, planning, organizing, project leadership and communications skills. Pharmaceutical industry applications experience and an advanced degree are desirable.

SENIOR PROGRAMMER ANALYST

This position involves implementation of database technology projects on PRIME computer systems. Requires an individual with six or more years experience in scientific computer applications with extensive experience in the design of interactive information systems and database implementation. A scientific background, experience with 4GL relational database systems and an advanced degree are desired.

PROGRAMMER ANALYST

This position will participate in the design and programming of research applications on PRIME computer systems. Requires an individual with 3-5 years experience in PRIMOS, FORTRAN and scientific computer applications with experience in design and implementation of interactive systems and database design.

You can look forward to a competitive starting salary; excellent company benefits; and a highly desirable location that combines a mild climate and relaxed lifestyle with easy access to numerous cultural, recreational, educational and historical attractions.

For prompt consideration, please forward your resume, indicating the position you are interested in, and salary history, to:

Human Resources Department
Attn: B.J.S.

(No Phone Calls, Please)
No Private Agency Referrals, Please

Rx Glaxo

P.O. Box 13398, Research Triangle Park, N.C. 27709

SYSTEMS TECHNIQUES SPECIALIST

B.S. degree or equivalent in Computer Science, experience in basic computer system GCOS8, DN8, TSS, DMIV-TP, GMAP; minimum 5 years experience in Data Processing, minimum 3 years experience as techniques specialist on a Honeywell System (DPS8). Beginning salary $34,415 to $37,063. Apply by 1/15/86 to:

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546 N. Stapley Dr.
Mesa, AZ 85203
(602) 898-7712

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INFORMATION SYSTEMS MANAGER

The City of Englewood, Colorado has an immediate opening for Information Systems Division Head reporting to Finance Director, plans, administers and directs all data processing, office automation, micro computers, data and telecommunications activities. Bachelor's degree in Computer Science, Information systems or other related field desired plus 3-5 years progressively responsible experience with Prime Information Systems preferred in an on-line, interactive environment. Salary $32,500 to $37,776 plus excellent city benefits. Please send resume with salary history no later than December 31, 1985 to: Employee Relations Department, City of Englewood, 3400 South Elati Street, Englewood, CO 80110. An Equal Opportunity Employer.

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STRUCTURAL ANALYST ENGINEER wanted for research and development on structural dynamics for the automotive industry using computer based Finite Element methods, stress and vibration analysis and optimization techniques; Requires M.S. degree in Mechanical Engineering; $33,280 per year; 40 hours per week. Send resumes to 7310 Woodward Ave., Room 415, Detroit, MI 48202 Ref. #70685 "Employer Paid Ad".

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Data Processing Professionals

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The person we seek for this highly visible position should have a minimum of 5 years of progressively responsible experience in managing a large IBM Data Center operation. Working knowledge of OS, JCL, TSO and MVS/JES operations coupled with extensive knowledge of automated scheduling packages and techniques are essential. A business orientation and excellent communication skills are critical. Bachelor's degree is required; Master's degree a plus.

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You will establish the capacity planning function. This would include evaluating capacity planning software, capacity planning and performance management and training staff in this area.

The successful candidate will have at least 5 years systems programming experience working with large scale IBM computers and MVS operating systems, with at least 2 of those years having been in hardware and software capacity planning and performance management.

Systems Programmers

You will be responsible for the installation and maintenance of MVS and related systems software. The successful candidate will have a minimum of 2-5 years experience working with large scale IBM computers. Additional knowledge of CICS, IMS, and VTAM along with other software would be a definite plus.

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FM

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Requires a BS or BA degree, backed by at least 7 years' experience with large-scale IBM data processing systems. A good mix of programming and analysis skills is required. Knowledge of CICS, TSO, MVS/XA, JCL, IMS, IDMS and ASSEMBLER is desirable. Background in EDP Auditing or Data Security a plus.

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To code, debug and document programs and analyze existing computer programs. Requires college degree, or equivalent, with at least 2 years' programming experience on a large-scale system; and knowledge of COBOL, IBM JCL, and TSO. Additional knowledge or experience in FORTRAN, VAX 780 VMS, CAD, IMS/DLI, CICS is an asset.

To explore your potential in the new power generation, consider one of these career options. We offer you a competitive salary in line with your experience and achievements and extensive benefits, including formal training and tuition reimbursement. For prompt consideration, please send your resume with salary history indicating position of interest and its designated Dept. number to: Employment Services, Virginia Power, P.O. Box 26666, Richmond, Virginia 23261. We are an equal opportunity employer. No third party submissions accepted.

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Manville Corporation, a diversified, international manufacturing and natural resources supplier with primary businesses in insulation, forest products, roofing and mining is seeking a Senior Programmer Analyst for its world headquarters located in the foothills of southwest Denver, four miles west of Chatfield Reservoir.

Senior Programmer Analyst (Primary Application MSA Payroll System) Candidates for this position will have a minimum of 1 year MSA Payroll experience and 5 years COBOL experience on OS/MVS IBM systems. Extensive experience with SAS or other fourth generation language as well as experience in management reporting and analysis desirable. Experience in personal computing systems WANG and DEC beneficial. Conscientious individual with the ability to work closely with users is essential.

Systems Programmer Candidates for this position will have one year experience in systems programming. Responsibilities will include secondary software coverage in our Data Base and CICS areas. Working knowledge of MVS/XA, OS/JCL, OS/UTILITIES, IBM ASSEMBLER, AND COBOL is required. Knowledge of TIS, MANTIS AND CICS are desirable.

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CICS or IDMS Prog/Anal (2 yrs MVS or DOS)	25-35K
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DEC Software Engr (2 yrs VAX or PDP 11)	25-35K
Software Engr (2 yrs 360, 4300, or 9000)	25-40K
Software Engr (2 yrs UNIX, 'C')	25-35K
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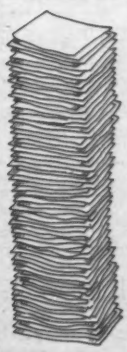
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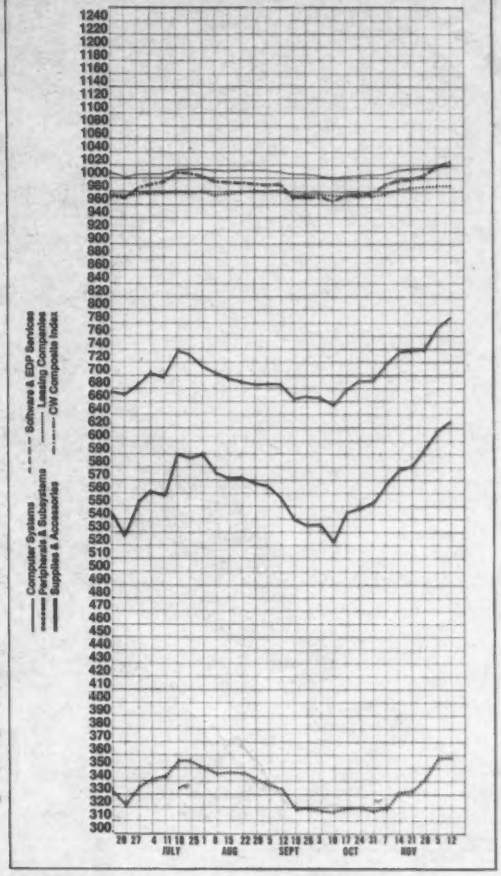
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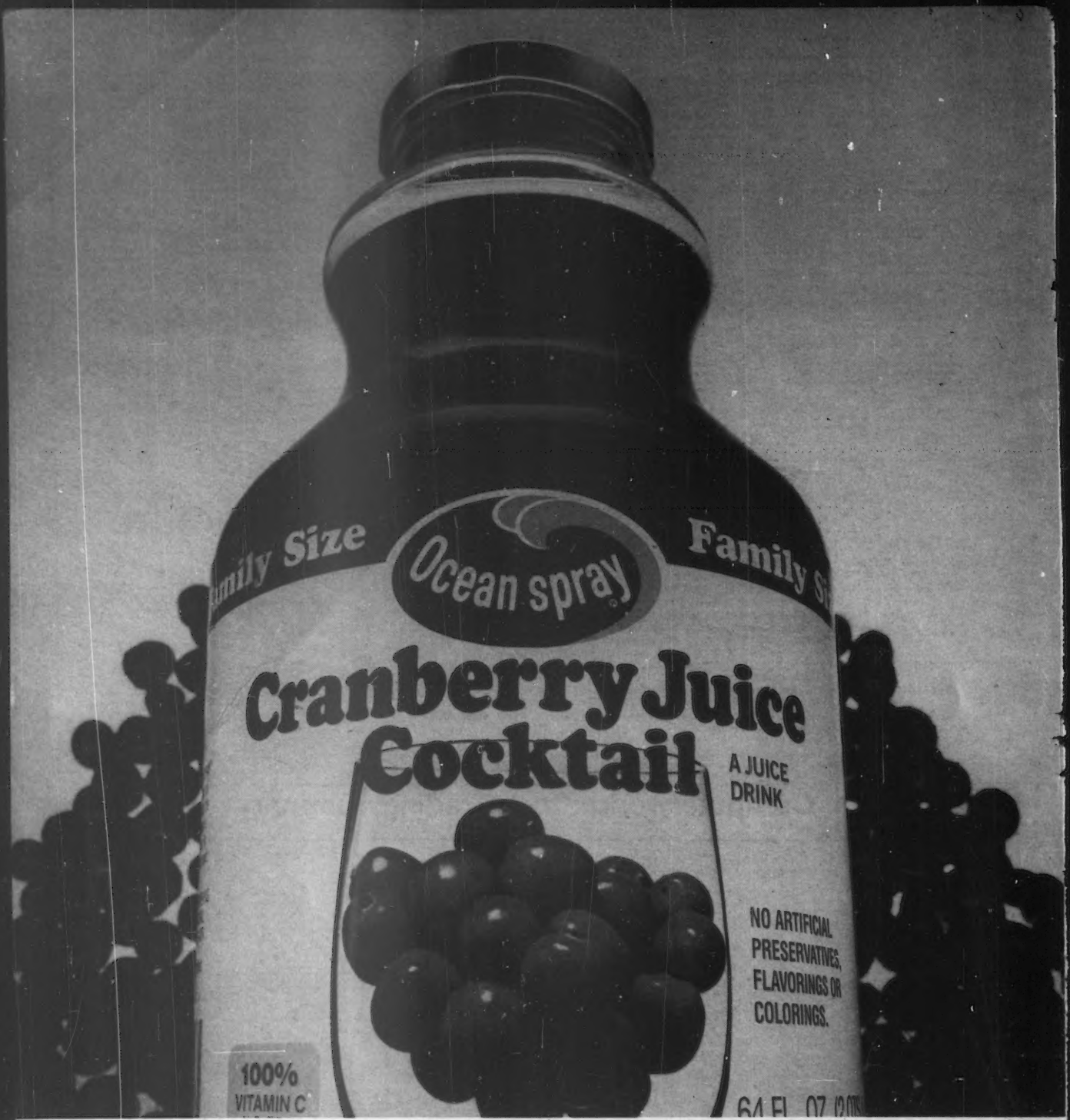
CLOSING PRICES WEDNESDAY, DECEMBER 11, 1985

	PRICE 1985 RANGE (1)	CLOSE DEC 11 1985	WEEK NET CHNGE	WEEK PCT CHNGE
COMPUTER SYSTEMS				
O ALPHA MICROSYSTEMS	5- 12	6	+ 1/2	+8.0
O ALTOS COMPUTER SYST	7- 14	12 7/8	+ 1/8	+0.8
A ARDENT CORP	10- 18	13 1/4	0	0.0
O APPLE COMPUTER INC	14- 31	18 3/4	- 3/4	-3.8
O APOLLO COMPUTER	8- 31	14 3/4	+ 1/2	+3.5
N AT&T	18- 25	24 3/8	+ 3/8	+1.5
N BURROUGHS CORP	51- 68	62	+2 1/8	+3.5
O COMPAQ COMPUTER CP	4- 14	14 1/8	+ 3/8	+2.7
O COMPUTER AUTOMATION	2- 6	2	+ 1/4	+14.2
A COMPUTER CONSOLES	8- 35	9	+ 3/8	+4.1
N CONTROL DATA CORP	18- 38	19 3/8	+ 1/2	+2.6
O CONVERGENT TECHNOL	5- 17	12	+ 1/4	+2.1
O CPT CORP	5- 12	7 7/8	0	0.0
N CRAY RESEARCH INC	23- 68	67 1/2	- 5/8	-0.9
O DAISY SYSTEMS CORP	21- 38	30	0	0.0
N DATA GENERAL CORP	31- 76	49 5/8	+3 5/8	+7.8
N DATAPOINT CORP	5- 23	5 1/8	+ 1/8	+2.3
N DIGITAL EQUIPMENT	85-133	132 3/4	+8 1/8	+6.5
A EXCEL INC	12- 18	15 3/8	0	0.0
N ELECTRONIC ASSOC.	3- 6	4 3/8	- 1/2	-10.2
N FLOATING POINT SYST	15- 37	28 3/4	- 1/2	-1.3
N FOXBORO	22- 34	28 1/2	+1 7/8	+7.0
O GOULD INC	20- 34	31	-2 1/2	-7.4
N HARRIS CORP	23- 35	27	0	0.0
N HEWLETT-PACKARD CO	30- 44	39 5/8	+1 1/8	+3.0
N HONEYWELL INC	53- 76	73 1/2	+1 1/4	+1.7
N IBM	118-149	148	+7 1/8	+5.0
O IPL SYSTEMS INC	1- 4	1 1/4	- 1/4	-16.6
N ITT CORP	26- 37	36	+ 1/2	+1.4
N NCR-COM INC	13- 24	14	+ 3/8	+2.7
N NANODATA CORP	2- 28	3 3/8	- 1/4	-6.8
N NATSUSHITA (ELEC.ADR)	46- 68	62	+4 5/8	+7.9
O NEXTON GRAPHICS	13- 30	20 1/4	+ 1/4	+1.2
N NOBUKA COMPUTER SYS	6- 10	7	+1 1/8	+18.0
N NONMAN DATA SCI	2- 19	1 3/4	0	0.0
N NOTUROLA INC	28- 44	38 1/8	+1 5/8	+4.3
O NATL SEMICONDUCTOR	10- 17	13 5/8	0	0.0
N NBI INC	11- 21	12 1/4	- 1/4	-2.0
N NCR	26- 37	36 3/4	- 1/4	-0.6
N PERKIN-ELMER	22- 30	30 1/8	+1 1/8	+3.8
N PRIME COMPUTER INC	15- 23	23	+ 1/2	+2.2
N SPERRY CORP	35- 58	51 3/8	+ 5/8	+1.2
O STRATUS COMPUTER INC	8- 23	21 1/4	+1 1/4	+5.8
O TANDEM COMPUTERS INC	16- 28	21 1/4	+ 7/8	+4.2
N TANDY CORP	24- 41	40 7/8	+1 1/8	+2.8
O TELEVIDEO SYSTEMS	2- 7	3 1/8	- 3/8	-13.6
O TELXON CORP	7- 22	21 3/4	+3	+18.0
N TEXAS INSTRUMENTS	88-148	138	- 3/4	-0.7
A ULTIMATE CORP	8- 24	21 1/2	- 3/4	-3.3
O WESTOR GRAPHICS INC	0- 1	1/8	- 1/16	-17.0
A WANG LABS "B"	15- 32	21	+ 1/8	+7.0
A WANG LABS "C"	13- 32	20 3/8	+ 7/8	+4.4
N XEROX CORP	47- 69	59 3/4	+ 5/8	+1.0
LEASING COMPANIES				
N CONDISCO INC	9- 27	26 1/2	+3	+12.7
N CONTINENTAL INFO SYS	5- 19	13 3/8	- 3/4	-5.2
O FINALCO GROUP INC	5- 7	5 3/8	0	0.0
O PHOENIX AMERICAN INC	2- 8	3 1/8	0	0.0
O SELECTRON INC	7- 14	8 3/4	- 1/4	-3.9
N U.S. LEASING	32- 43	38 1/4	+2 1/2	+6.8
COMPONENTS				
N ADVANCED MICRO DEV	23- 41	30 3/4	+1 1/4	+4.2
O ADV'D SEMICONDUCTOR	0- 23	10	+ 7/8	+8.9
N ANALOG DEVICES INC	18- 28	25 3/8	- 1/4	-0.9
N ANALOGIC CORP	8- 18	12 1/2	- 3/8	-2.9
N APPLIED MAGNETICS CP	8- 18	14	+1 1/2	-9.6
O HARRIS CORP	5- 10	6 1/2	- 1/8	-1.9
O MICRO MASK INC	6- 14	7	+ 7/8	+14.2
N TERADYNE	18- 39	24 5/8	+1 3/8	+5.9

EXCH: N=NEW YORK; A=AMERICAN; P=PACIFIC; B=BOSTON; L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
O-T-C PRICES ARE BID PRICES AS OF 3 P.M. OR LAST BID
(1) TO NEAREST DOLLAR

	PRICE 1985 RANGE (1)	CLOSE DEC 11 1985	WEEK NET CHNGE	WEEK PCT CHNGE
SOFTWARE & EDP SERVICES				
O ADVANCED COMP TECH	2- 4	3 3/4	- 1/4	-6.2
N ADVANCED SYSTEMS INC	6- 20	16 5/8	+1 3/8	+8.0
N ADR COMPUTING INC	10- 18	15	+1 1/8	+8.2
O AMERICAN SOFTWARE	7- 15	12 1/4	+1	+8.8
N ANACOMP INC	1- 4	3	- 1/8	-4.0
O ANALYSTS INTL CORP	9- 11	7 3/4	- 1/2	-6.0
N APPLIED DATA RES	17- 40	31 7/8	- 1/8	-0.3
O ASHTON TATE	6- 18	18	+1 1/8	+6.2
O ASK COMPUTER SYSTEMS	8- 24	12 1/2	+ 1/4	+2.0
O ASTRONYME CORP IND	1- 7	1 3/4	+ 1/8	+7.8
N AUTOMATIC DATA PROC	39- 59	57 3/8	- 7/8	-1.6
O COMPUTER ASSOC INT'L	18- 30	29 1/2	+2 1/4	+8.2
O COMPUTER HORIZONS	9- 13	14 3/8	+ 1/4	+1.7
O COMPUTER NETWORK	5- 10	5 3/8	- 3/8	-6.2
O COMPUTER SCIENCES	12- 28	28	- 1/8	-0.4
O COMPUTER TASK GROUP	10- 23	20 5/8	- 1/8	-0.6
O COMPUTER USAGE	1- 3	1 1/2	0	0.0
O COMPUTONE SYSTEMS	4- 11	9 1/2	+1 3/8	+20.3
O CONSERV CORP	1- 6	2 7/8	0	0.0
O CONSHARE	8- 12	11 1/2	- 1/8	-1.0
N CULLINET SOFTWARE	14- 33	15 5/8	-1 1/8	-6.7
O CYCARE SYSTEMS INC	10- 27	18	+1	+5.9
O HOGAN SYSTEM INC	4- 15	7	+ 7/8	+14.2
N GENERAL ELECTRIC CO	53- 68	67 7/8	+2	+3.0
N GENL MOTORS E (EDS)	17- 47	41 1/4	+ 1/2	+1.2
N GTE CORP	30- 45	44 3/4	+2 1/8	+4.8
O INFORMATION SCIENCE	1- 6	2 1/8	+ 3/8	+21.4
O INFOTRON SYSTEMS CP	19- 35	16 1/2	+1	+6.4
O KEANE ASSOCIATES	8- 18	13	+ 3/4	+6.2
N LOGICON	24- 41	40 1/2	+ 3/4	+1.8
O LOTUS DEVELOPMENT CP	18- 34	24 3/4	+1 1/4	+5.3
O MCI COMMUNICATIONS	7- 11	10 5/8	+ 3/8	+3.6
O MNGT SCI AMER INC	8- 18	9 3/4	-1 1/4	-11.3
O MATHEMATICAL APP GRP	2- 9	1 1/2	- 1/2	-25.0
O MICOM SYSTEMS INC	14- 42	20 3/4	0	0.0
A MICROPRO INT'L CP	2- 4	2 1/2	+ 1/8	+5.2
O NATIONAL DATA CORP	7- 17	16 7/8	+ 1/4	+1.5
O ON-LINE SOFTWARE INT	6- 10	8 1/4	+ 3/4	+10.0
O PANSOPHIC SYSTEMS	11- 23	24 1/4	+ 3/4	+3.1
N PLANNING RESEARCH	8- 18	17 1/2	+ 1/4	+1.4
O POLICY MGMT SYSTS CP	18- 35	21 1/4	+ 1/2	+2.4
O PROGRAMMING & SYS	4- 8	6	+ 3/8	+6.8
O REYNOLDS & REYNOLDS	28- 48	43 1/4	+1 3/4	+4.2
O SEI CORP	11- 23	22 5/8	+ 5/8	+2.8
O SHARED MEDICAL SYST	24- 37	35	+1	+2.7
O SCIENTIFIC COMPUTERS	2- 7	2 1/2	0	0.0
O SOFTWARE AG	11- 22	16 1/2	- 1/4	-1.4
N UNI CORP	10- 14	12 3/8	+ 5/8	+5.3
N VISICORP	8- 17	16 1/4	+ 7/8	+5.6
O VM SOFTWARE	17- 24	23	+ 3/4	+3.2
PERIPHERALS & SUBSYSTEMS				
P AM INTERNATIONAL	3- 8	5 3/8	+ 1/4	+4.8
O ANDERSON JACOBSON	2- 11	2 1/8	- 1/4	-10.5
O AST RESEARCH INC	7- 32	31 3/4	+1 5/8	+5.3
O AUTO-TROL TECHNOLOGY	6- 12	9 1/2	- 1/2	-5.2
O AMBNT-BARBE COMPUTNG	6- 28	8 3/4	-1 3/8	-28.8
O BANCTEC INC	9- 12	9 1/8	- 1/2	-5.7
O BEEHIVE INT'L	1- 2	1/4	0	0.0
N BOLT,BERANEK & NEW	19- 38	38 3/8	+ 3/4	+2.1
O CORVUS CORP	1- 2	7/8	0	0.0
N CENTRONICS DATA COMP	3- 12	4 1/2	- 1/8	-2.7
A CETEC CORP	0- 10	7 1/8	0	0.0
A CIPHERTRONICS	4- 7	3 3/4	0	0.0

	PRICE 1985 RANGE (1)	CLOSE DEC 11 1985	WEEK NET CHNGE	WEEK PCT CHNGE
N COMPUGRAPHIC CORP	24- 37	27 3/8	- 3/8	-1.3
O COMPUTER TRANSCEIVER	1- 4	3 5/8	-	+5.7
O DATATRANSMISSION CORP	10- 18	13 1/8	+ 1/4	+1.8
N COMRAC CORP	13- 18	16 1/2	- 1/8	-0.8
A DATAPRODUCTS CORP	11- 24	18 3/8	+ 1/2	+3.1
A DATARAM CORP	3- 8	6 7/8	+ 1/2	+5.8
O DATA SWITCH CORP	4- 8	6 7/8	+ 7/8	+14.5
O DATUN INC	5- 8	5	- 1/8	-2.4
O DECISION DATA COMPUT	9- 18	12 1/8	- 3/8	-3.0
O'DATRONIC CORP	1- 28	3 3/8	+ 3/8	+11.2
O EVANS & SUTHERLAND	6- 21	18 7/8	-2 1/8	-10.1
O GANDALF TECHNOLOGIES	3- 20	7 1/2	0	0.0
N GEN'L DATA COMM INC	6- 30	12 1/2	+ 3/8	+3.0
N HAZELTINE CORP	3- 28	24 5/8	+1 1/4	+4.8
O ICOT CORP	6- 17	7 5/8	+ 1/2	+7.0
O INFORMATION INTL INC	4- 15	12 7/8	+ 3/8	+3.0
O INTECOM INC	4- 28	9 1/2	+ 1/2	+10.0
O INTEL CORP	4- 30	30	+ 1/2	+1.6
A LUNDY ELECTRONICS	4- 14	13 3/8	+ 3/4	+5.8
O MICRODATA CORP	3- 13	4 1/4	- 1/8	-2.8
A MSI DATA CORP	6- 20	9	+1 1/4	+16.1
N MAGNUM CORP	15- 28	27 1/2	+ 1/2	+1.8
O NETWORK SYSTEMS CORP	20- 49	23 1/2	+ 1/2	+2.0
N NO AMERICAN PHILIPS	30- 42	38 1/8	+ 1/2	+1.3
N NORTHERN TELECOM LTD	1- 28	24 5/8	+1 1/4	+5.7
O OMEX	1- 3	1/2	0	0.0
N PANSCIENE CORP	7- 14	8 1/4	+ 1/2	+5.7
A PENRIL CORP	7- 28	7	- 1/8	-1.7
N PLESSEY CO (ADR)	9- 28	28	+ 1/4	+0.8
O PRINTRONIX INC	6- 17	13	0	0.0
O RMS INC	3- 11	8 7/8	0	0.0
O RAMTEK CORP	1- 7	3 1/4	+ 1/4	+8.3
N RECOGNITION EQUIP	9- 51	13 3/4	+ 1/8	+0.8
N SANDERS ASSOCIATES	11- 27	27	+ 1/2	+1.3
O SCAN-TRON CORP	9- 17	10 1/4	- 1/2	-2.8
N SCIENTIFIC ATLANTA	6- 14	11 1/2	- 3/8	-3.1
O SEAGATE TECHNOLOGY	2- 12	8 7/8	+ 1/8	+1.7
N STORAGE TECHNOLOGY	1- 3	1 3/4	- 1/8	-6.8
O SYKES DATATRONICS	0- 11	1/8	0	+1.1
A T BAR INC	5- 20	5 1/2	- 1/4	-4.3
A TAB PRODUCTS CO	4- 18	16 1/4	+ 1/8	+0.8
O TANDON CORP	3- 13	4	- 3/8	-8.9
A TEC INC	7- 28	7	0	0.0
N TEKTRONIX INC	30- 83	59 1/2	+3 1/4	+5.2
N TELEX	1- 60	58 1/2	+3 1/8	+5.6
O TESDATA SYSTEMS CP	1- 23	1 1/4	- 1/8	-9.0
N TIMEPLEX INC	5- 22	20 3/4	- 1/4	-1.1
N TYMSHARE INC	3- 8	8 5/8	- 3/8	-4.1
O VISUAL TECHNOLOGY	1- 10	3/4	0	0.0
SUPPLIES & ACCESSORIES				
N AMERICAN BUS PRODS	21- 32	32 1/4	+ 7/8	+2.7
N BARRY WRIGHT	17- 33	18 1/2	+ 1/8	+0.6
A DUPLEX PRODUCTS INC	12- 21	21 3/8	+ 5/8	+3.0
N ENNIS BUS. FORMS	10- 23	22 3/4	- 1/2	-2.1
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Millennium applications are on-line, real-time, integrated with all major data bases. The complete Millennium family includes an interactive PC link and systems development tool.

We are about to deliver Ocean Spray's second Millennium version, Millennium 2.0. Even more advanced than the original. With it we send our thanks for believing in Millennium the first time around.

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